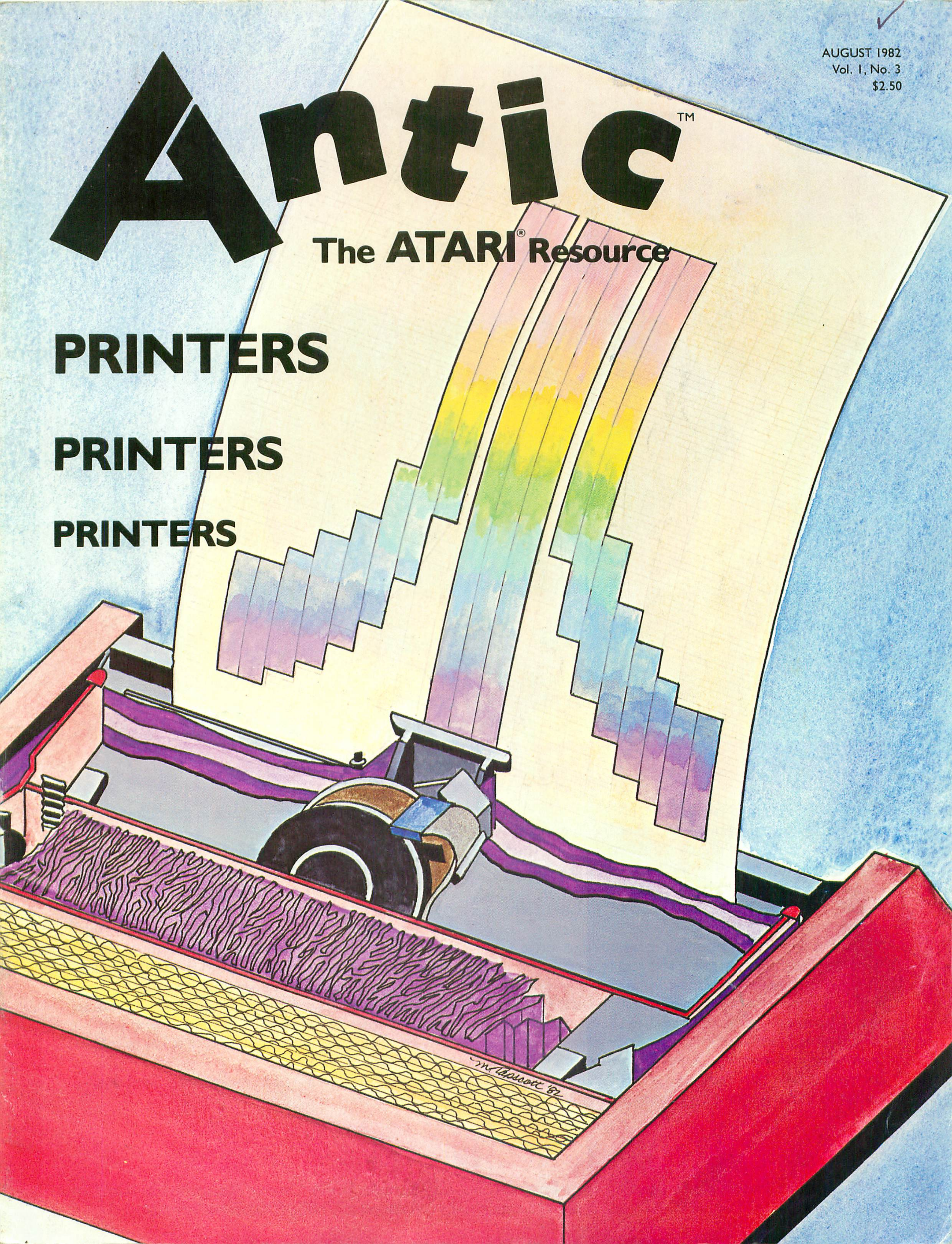
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Antic™

The ATARI® Resource

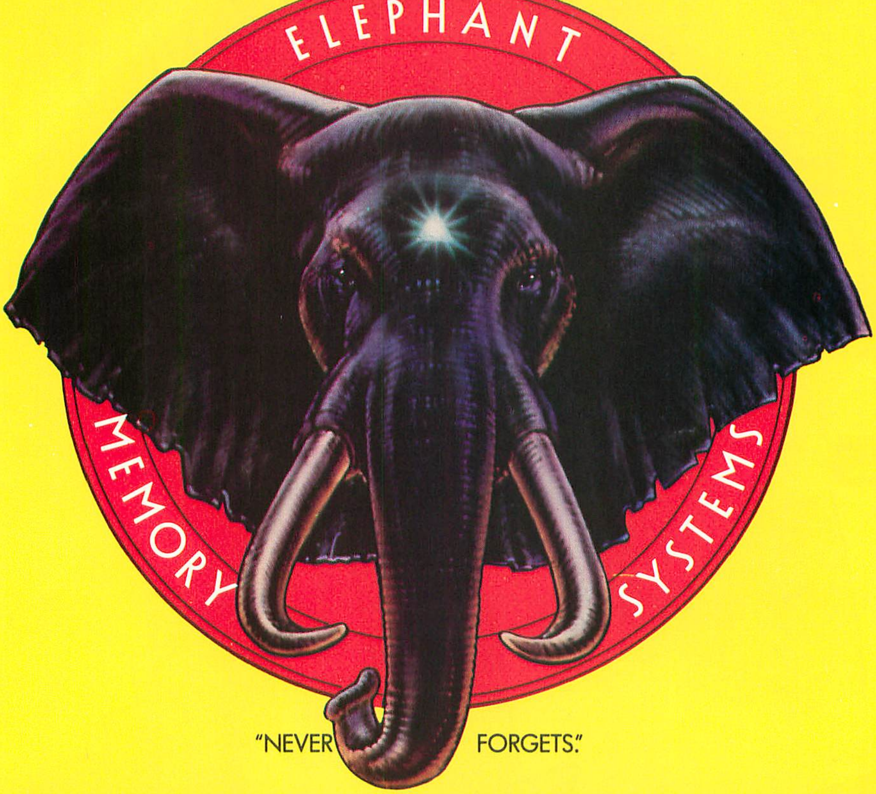


PRINTERS

PRINTERS

PRINTERS

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They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to make life miserable for everyone in the disk-making business.

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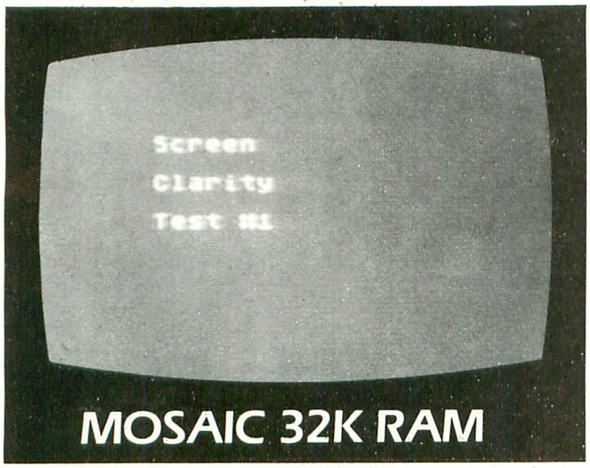
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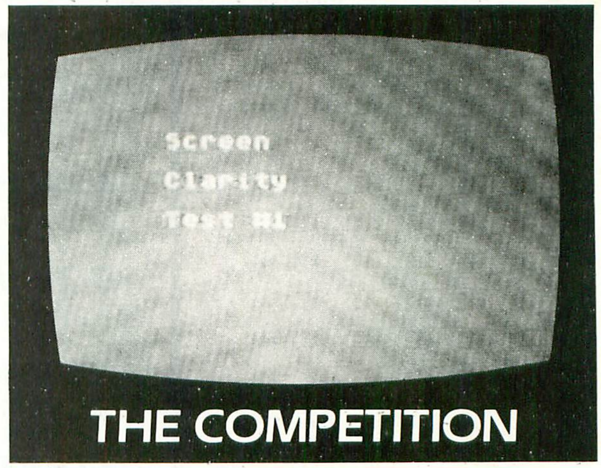
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- Low power design for safety and reliability.
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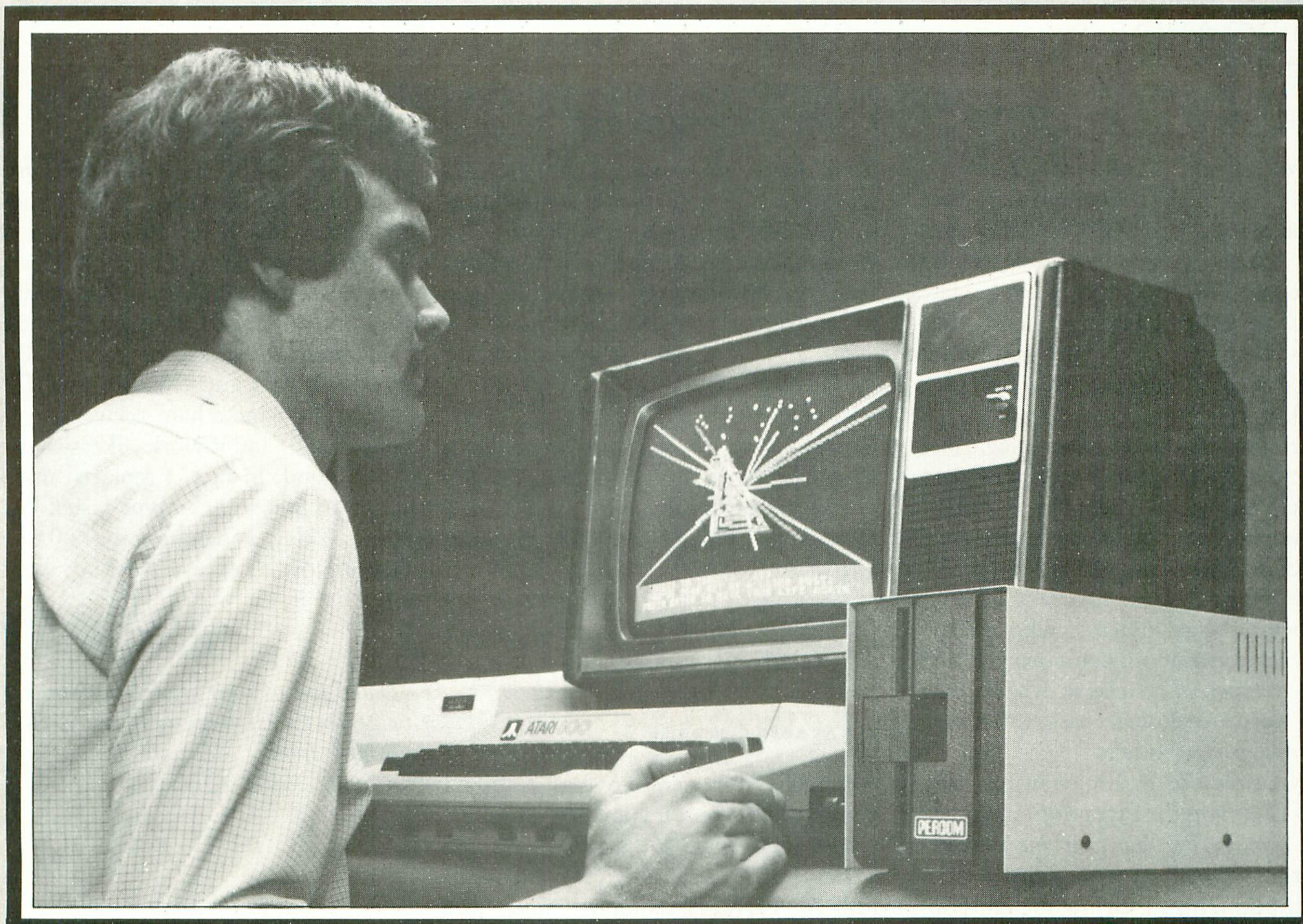
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NOVICE LIFER

I have had my ATARI for 32 days. I studied the BASIC manual and have started to program, but WOW, do I need help! There are zillions of books on Apple and TRS-80, but they don't relate to ATARI. When I ask store clerks, they type something quickly and VOILA!, it works. But I don't know what they typed.

I've seen articles in other magazines about the ATARI, but there's a big gap between them and where I'm at. Everyone writes about machine language. I tried a few lines in my computer, and all I got were ERROR messages.

I believe that someone who doesn't know anything about computers should write a series of articles in ANTIC. As they learn, they can pass their new knowledge on to others.

My family has had a lot of fun with Chicken. It was the first program I typed from a magazine that worked perfectly as written! Here's a money order for a subscription. If you sell lifetime subscriptions, I want one.

B.B. Storey
Ontario, CA

We hear you loud and clear. Beginners are our lifeblood. Follow Starting Line, and watch for other helpful pieces. —ANTIC ED

TYPING TIGERS

The first thing we did with our new ATARI 800 was to type in Chicken from ANTIC #1. It took two days, taking turns with my kids, to get it all in straight, but finally it worked! Using the BREAK key to stop it, though, causes the whole system to lock-up (wide vertical lines). What's going on?

Daley Myers
Worthington, OH

The vertical lines are the Player/Missile graphics out of synch. Press System/Reset and everything should be ready to go again. —ANTIC ED

DOWNLOADING TO DISK

Your article on modems (ANTIC #2) was not clear on this point: can all information and program from utilities like CompuServe be saved to disks and cassettes, or must the user keep the line open to receive?

Dan Miller
Greensboro, N.C.

Downloading is software dependent. The hardware is capable, within memory and speed limitations. Check chart in ANTIC #2, page 13, for more info. —ANTIC ED

PLEASANT SURPRISE

As an ATARI owner for over two years, I congratulate you on your first issue.

I was pleasantly surprised by the variety and presentation. I was excited to find a FORTH column (since I've decided I despise BASIC for large program development). I typed in Chicken, and was amazed that it worked, and was even entertaining! In fact, all your listings were clear, easy to read, and accurate. That is no mean feat.

Complaints, I have a few. Please don't split articles up into different parts of the magazine. It's easier to read from front to back. Also, while I think highly of ANTIC, I will not subscribe since I save no money that way. I'll buy at the store and skip any issues that look like "dogs." If there were a subscription advantage, I probably would subscribe.

Keep up the good work.

Charles McMath
Springfield, VA

We will try to "jump" fewer articles, but there are many considerations. Our price is fair, we think, for the value. A subscription assures you get your magazine regularly. Who knows, your dealer might sell out. Thanks for the encouragement. —ANTIC ED

AA5R, DO YOU READ?

In the June ANTIC, James Howard of Austin, TX, asked about RTTY and the ATARI. My call for 30 years has been K2BSM, and I'll pass on what I learned at the Dayton convention last April.

Kantronics, of Lawrence, KS, makes an "interface" and software to send and receive RTTY and CW using the ATARI 400 or 800 and a ham xceiver. I bought one ($250) and it works like a charm.

So good, in fact, I replaced my 400 with an 800 so I can type faster. I'm 72 years young, and bought the 400 to play with. Now it's excess. Anybody want it?

A. Kruhm, K2BSM
Flushing, N.Y.

Delighted to start reader exchange with K2BSM. Feel free to respond to I/O Board items. We will try to accommodate. —ANTIC ED

GAME GAMER

Your game programs are good, but the typing errors I make are not much fun. "Softside" formats their listings narrower, to match the screen. When you publish the checksum program, please include the tables for Chicken and Death Star.

A table of variables, with related functions, would be appreciated. I liked Stan Ocker's "Game Programming," especially the flowchart. All of this helps us LEARN programming.

How do you disable the "end of line" buzzer?

Dan Howlett
Concord, CA

We are experimenting with narrow formatting and agree it is useful. The checksum program, TYPO, appears this issue. Both games run if entered exactly as listed. Variable tables will be sought from authors of listings, but no promises. The EOL buzzer is there as a warning. Anyone know how to disable it? —ANTIC ED



Good Golly! What A GAME!

The original arcade game **PREPPIE!** will give you hours of toe-tickling fun. **You** take the controls, moving your young prepster about on the golf course. And what a golf course! It's unlike any you have ever played on before. There are dangers **everywhere,** and only you can keep the little Ivy Leaguer from a fate worse then Penn State!

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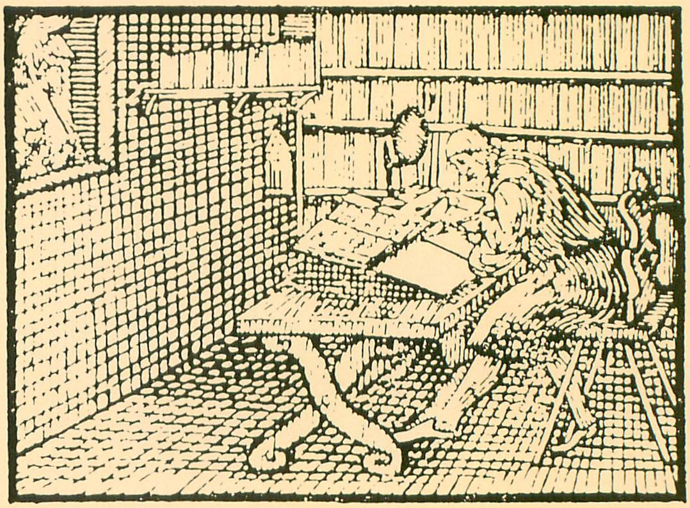
"My Atari never did things like this before!"
—Holister Townsend Wolfe

"I had so much fun I almost blew my doughnuts."
—Theodore Boston III

"I haven't had this much fun since Buffy and I went to Princeton for the weekend."
—Martha Vineyard

Printers Reviewed

by Jon Loveless



In this article we examine seven different printers from seven different manufacturers.

Terminology

Following is some printer jargon you will find helpful.

CPS — Characters Per Second

This rating was once considered the true test of a printer. These ratings are often misleading. If a printer has three different sets of characters, it will have three different CPS ratings. Most ratings are based on conditions ideal for speed. We have developed a benchmark to compare each printer under similar conditions. This test prints 50 lines of 80 characters per line.

CPI — Characters Per Inch

All printeres seem to use a 10 CPI standard type size. Most also use a condensed (16 or 17 CPI) and an enhanced (bold 5 CPI). A few of the tested printers use a correspondence quality proportional print font. Proportionally spaced characters use only as much space as they need. A capital "W" takes more space than a small "i" for example.

Dot Matrix

This refers to how each of the tested printers forms the characters on paper. Each character is made up of a number of dots. These dots are created by pins that are forced out of the printer head to impact the ribbon and paper, causing an impression. Print heads use from seven to nine pins stacked up one on top of another. Each character is formed by a number of movements of the print head (again, usually from 7 to 9). Each movement of the head forms another column of dots comprising the character. This happens so fast that it appears as though the letter is printed all at once. A 9 x 9 dot matrix, then, would be able to print letters or characters using any combination of 81 dots. Graphics capabilities, requiring appropriate software, allow individual dots to be positioned anywhere on the paper.

Buffer

A buffer is memory within the printer that stores data from the computer until it can be printed. Buffers vary in size, with options for 1000 and 2000 characters becoming widely available. Peripheral products are appearing that will allow attachment of buffers in 8000 (8K) character increments.

Font

This is the style or "face" of the type your printer produces. Many printers now have fonts that change with the CPI. Be sure to see a sample of the available fonts before you buy. Some inexpensive dot matrix fonts are hard to read.

Friction and Tractor Feed

These terms describe the method by which the paper is fed through the printer. Tractor, also known as pin-feed, requires paper with holes in the margins and generally comes in "fan-fold" boxes. This is convenient and allows continuous printing.

Friction feed is like a regular typewriter feed, and allows single sheet operation or roll paper. The latter is not very practical but the paper is inexpensive.

Logic Seeking (short line)

Actually, "short-line seeking" is a better description than "logic seeking." If a given line is less than margin-to-margin, the printer will make a carriage return when the last character is printed, rather than wait until the head has moved across the page. This speeds up printing when lines are short as when doing program listings.

Parallel and Serial

Of the two, Parallel data transmission is faster. The 850 interface uses a parallel port to connect with your printer. Since most printers use a standard parallel connection compatibility problems are reduced.

PRINTERS COMPARISON CHART

FEATURES	NEC 8023A-C	EPSON MX80	ATARI 825	MPI-99G	AXIOM GP100	C.ITOH 8510	OKIDATA 84a	IDS Prism
Friction feed	Y	Y	Y	Y	Y	Y	Y	Y
Tractor feed	Y1	Y2	Y3	Y2	Y2	Y1	Y2	Y
Reverse feed	Y	X NOTE 1	Y1	N	N	Y	N	NOTE 2
Skip over perf	N	X NOTE 1	N	Y	Y	N	Y	Y
Lines per inch	V	V	V	V	V	V	V	V
Max paper width	9½″	9½″	9½″	9½″	9½″	9½″	16″	15″
Min paper width	4″	2½″	9½″	½″	½″	4″	2″	2″
Chars per second	100	100	80	100	100	100	200	200
Benchmark speed	81	92	73	79	77	83	161	NOTE 2
Chars per inch — *5 (enhanced)*	Y	Y	Y	Y	Y	Y	Y	Y
10 (standard)	Y	Y	Y	Y	Y	Y	Y	Y
12 (medium)	Y	N	N	N	N	Y	Y	NOTE 2
16/17 (condensed)	Y	Y	Y	Y	Y	Y	Y	Y
Proportional	Y	N	Y	N	N	Y	Y NOTE 3	Y
Letter descenders	Y	Y	Y	Y	Y	Y	Y	Y
Top of form	Y	Y	Y	Y	Y	Y	Y	Y
Self Test	Y	Y	N	Y	Y	Y	Y	Y
Bidirectional	Y	Y	N	Y	Y	Y	Y	Y
Short line logic	Y	Y	N	Y	Y	Y	Y	Y
Graphics	Y	Y	N	Y	Y	Y	Y	Y
Ribbon type	C	C	O	C	C	C	S	S
Cable	U	U	Y	Y	Y	U	U	X
Overstrike (bold)	Y	Y	Y	Y	Y	Y	Y	Y
Underline	Y	X NOTE 1	Y	Y	N	Y	Y	Y
Manual	1	2	2	1	4	3	1	1

Y = Yes, included as part of the package
N = No, not included as part of the package
X = Extra cost option
U = Unavailable from manufacturer
F = Future availability expected
V = wide or unlimited selection
C = Cartridge
O = Open
S = Spool

1 = excellent
2 = good
3 = fair
4 = poor

NOTE 1: MX80 F/T with GRAFTRAX-Plus
NOTE 2: Not Tested
NOTE 3: Requires 2 passess of the print head

The Printers

NEC 8023A-C

The NEC printer works well with the ATARI. It is a sturdy, well-built printer and with several good features. First, it has a high-quality proportional character set that is fully supported by the latest version of TEXT WIZARD© by DataSoft and their new companion to MICRO-PAINTER, COLOR PRINT©. This makes it a very versatile printer which will produce quality letters as well as great graphics.

I especially like the ease of paper handling. The NEC supports both tractor and friction feed, with a minimum of difficulty. There is a lever that engages/disengages the pressure rollers, allowing a quick change from one type of paper to another. Tractor-feed paper loads easily on the NEC due to the tractor mechanism that engages the paper before it gets to the roller (platen). This means, that the tractors do not interfere with the print head at all, and allow for the paper to be torn off just above the print head. Most other printers require you to waste a full sheet of paper each time you wish to remove your printed work. I have two complaints about the NEC. First, the sound seemed to be louder and higher than others. Second, the ribbon cartridge cover has snap latches that felt as though they would break each time I removed the cover.

I rate the NEC very high as an all around printer. It includes most of the desired features as standard equipment, is sturdy, and is priced right.

EPSON MX80 F/T

The top model in the EPSON line, this is a high quality printer that handles both friction and tractor feed. The standard model comes with 12 character type and size combinations and 3 boldness options, all software selectable. It produces quality type for word processing, and works with all major word processors, and lacks only a porportional print.

The tractor feed is a good one, and is removable, but sits above the print head. This wastes paper each time you tear off the current sheet. A set of user-installed ROM chips add significantly to the MX-80, but cost extra in most cases. This is the second generation of add-on chips for the EPSON, so be sure you are getting the GRAFTRAX-Plus chips. These will add features such as italic print in all 12 character types, underlining, and of course great graphics. EPSON produces a solid printer that will meet most needs. If it only had a proportional character set I would place it close to the top.

OKIDATA-Microline 84

This top-of-the-line printer put us at a disadvantage very quickly. Our intention was to review printers costing $1,000 or less. This model retails for $1495. We were tempted to eliminate it, but reconsidered after working with it for a while. First, it is a wide printer, but not large considering its 16″ paper-width handling capability. It's main benefit is speed. Rated at 200cps by the manufacturer, it really seems to go that fast. During a program listing session, it actually kept up with the computer! Also, it produced excellent quality characters, and has full graphics built in. The tractor mechanism is standard and worked well throughout our testing. It is easily removable, but like the EPSON wastes a sheet of paper in order to tear off the current sheet.

This printer is the fastest of those tested, and that's important when you do a lot of printing. Otherwise, you might want to consider one of the other OKIDATA printers such as the Microline 82A. This is a standard size printer with most of the other features of its big brother, except the speed and graphics.

C. ITOH 8510A

This printer looked like a carbon copy of the NEC 8023A-C reviewed earlier. In fact, the paper handling, print mechanism, cover and switches are virtually identical. Print type even seemed similar until the proportional type was examined closely. A few of the proportional letters are not complete looking, the serifs are missing. The serif is the little tail found at the ends of letters. In all other respects this printer performed like the NEC.

AXIOM-IMP MiniPrinter

This printer has no features that make it stand out, but it is a solid, average machine. The character formation is good, and the print quality clear. It has a wide variety of font/size types, but no proportional font. The built-in graphics are standard, and appeared to be acceptable, but not great. The printer came with a disk of software (the only printer that did). The disk included several sample pictures that could be printed and I assume this will continue to be a standard part of the package.

I have three complaints about this printer. First, the paper is difficult to load. You have to turn the printer upside down and feed the paper through a slot in the bottom. Second, you have to turn the printer "on" to feed paper because there is no knob for manual paper advance. You have to use the line-feed function to set the top-of-form, and that can be difficult. The third annoyance is that the fan runs whenever the printer switch is on.

Micro Peripherals — MPI 99G

When I first saw this printer at last year's Computer Faire in San Francisco, I was impressed by its ability to produce high quality graphics. But the mechanism, I found, was nearly identical to the AXIOM Imp. The paper was difficult to load the first time through, and I began to think that my first impression was wrong. Well, the bottom line is that some of the problems with the Imp still exist, but others have been overcome. Noise is less of a problem because there is no fan, and it comes with a cover that shields out much of the racket. There is a document quality font created by an 11 × 7 matrix giving very good quality, though not proportional. The nicest feature of the MPI is the single sheet tray that fits on the under-side of the body. Once in place, you can feed a single sheet in perfectly from the front of the printer. Finally, MPI gets an A + for providing a cable WITH the printer. This is a nicely packaged printer with a few minor deficiencies.

ATARI 825

This printer is the Centronics 727 with an ATARI label. The ATARI 825 proportional print is excellent and produces a fine looking right hand justified document if used with any of the 3 major word processors. It has pin-feed as well as friction feed, and forward and reverse paper feed. This is a solid quality printer, but not without its problems. The inked ribbon is the dirtiest and by far the most difficult to change. I have spewed ribbon throughout my computer room on several occasions. The ribbon is loose and not in a cartridge, which makes handling difficult. Next, it doesn't have adjustable pin feeds. This means you have to find really wide label sheets or use the friction feed option for label printing. If you have ever tried that, you will not consider label printing to be one of the ATARI 825 strengths. Finally, paper feed is poor which causes many jams when doing larger print jobs.

INTEGRAL DATA SYSTEMS — Prism 132

Another new entrant to the printer market is the IDS Prism. Makers of the Paper Tiger series have now produced the Prism in 2 models that have 80 or 132 column paper capability. Due to our inability to get a cable in time to do a working test, we can only list some of the specifications. First, it is the largest printer we looked at (9 × 22 × 12″) and the heaviest (29 lbs). It also has some impressive options available at an extra cost. True color printing, for example, using a multi-colored ribbon; a high speed feature alowing over 200 CPS; a semi-automatic single sheet paper feed tray, and one or 2 others. The printer came with a test sheet that indicated very impressive graphics capabilities also, so this one is deserving of more in-depth test. Watch the next issue of Antic for an update.

COMPATIBILITY

Peripheral devices not made by or specifically for ATARI raise the question of incompatability.

CABLES

There is no standard printer cable, but the Centronics parallel connection is a wiring protocol that comes close. This has little to do with the plug type, however. The most common cable connection for printers is a 36-wire plug at the printer. This is connected to a cable, and at the other end is a 15-pin connector to plug into the ATARI 850. Of the printers tested here, only 3 did not use this type of connection, and 2 of those come with a cable. The MPI has an internal cable connection and comes fully equipped, ready to go. The same is true of the Atari 825 printer. The AXIOM Imp we tested also came with a cable, available at extra cost. The IDS Prism uses a different connector than all three, and unfortunately we were not able to locate one in time to do a true test on the machine. All of the other printers worked fine using the cable I made up for the NEC printer. These printers are noted by a "C" in the cable column in our chart, but if that column does not also show an "I" for "included", then you are on your own for a cable.

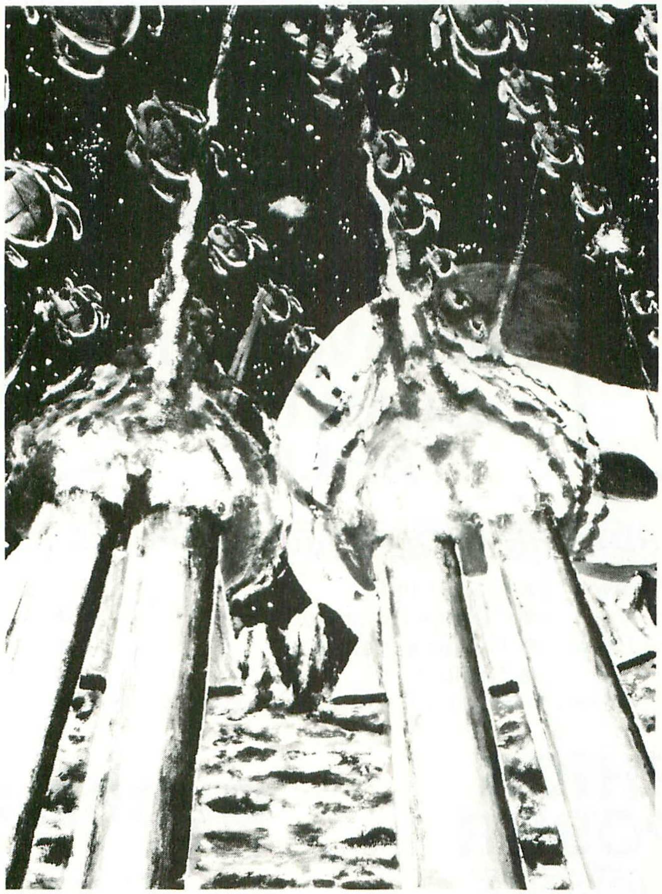
CONTROL CHARACTERS

You have heard the term "under software control" before. The major of parameters, such as type size, line spacing, and character emphasis, are controlled by sending the printer code from the computer. There is no discernible standard as to what these codes should be, and as a result, each printer is unique. Be very aware of the following: Word Processors are designed for specific printers. In some cases they may allow modification (LJK's top of the line) and in some cases they can handle more than one printer (TEXT WIZARD). Some printers allow you to modify the control codes to suit a particular application (EPSON—with GRAFTRAX), but most printers and word processors do not. Check the printer specifications and the word processor specifications before you make a purchase. The word processors are being updated to allow a wider selection, so check version numbers carefully. The ATARI Word Processor will work with most printers if you understand the control codes. A unique feature allows you to insert special control characters and it will right justify

continued on page 21

MOONBASE IO

• the battle for the moons of Jupiter •



Blast your way through the alien mine fields! Defend the moonbases from an attacking alien armada! It won't be easy. To win you will need to mount a heroic assault on the alien mother ship.

Moonbase Io combines three exciting arcade adventures in one exciting game. The machine-language program by John Konopa uses advanced graphics and sound effects. Action is fast and exciting—varying levels of skill required to go from one part of the game to the next.

BEYOND SOFTWARE

BEYOND SOFTWARE's arcade-adventures are the next generation in computer games for the ATARI™ computer. A voice-activated program will help you meet and overcome the challenge—it may be an alien invasion, a fiendish murderer preying on a country village or a treasure trove buried deep in the shark-infested sea.

Moonbase Io is available at fine computer dealers. Or, directly from PDI for $29.95 plus $2.00 shipping and handling.

Requires 24K ATARI™ computer with disk and cassette.
Cassette version available soon.

PDI

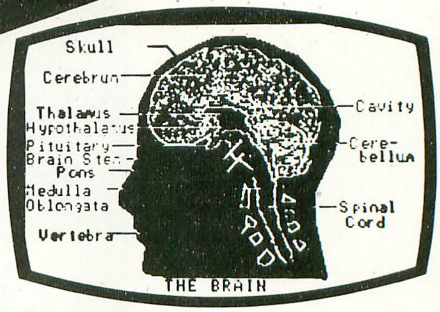
Program Design, Inc., 11 Idar Court, Greenwich, CT. 06830 203-661-8799

Versa Computing

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COMPLETE HARDWARE / SOFTWARE GRAPHICS SYSTEM - $299

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- Color Fill-In
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- Reverse Picture
- Scaling
- Split / Full Screen
- Save / Load / Erase
- Text Writer
- Fix X or Y Axis

Requires: Atari®300, 32K RAM, Basic Language Cartridge, Disk Drive

GRAPHICS COMPOSER

PADDLE / JOYSTICK GRAPHICS SOFTWARE - $39.95

- Draw on Hi-Res Screens 7 or 8
- Save Pictures on Disk or Cassette
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- Geometric Figures Program
- Add Text to Screen

Requires: Atari®800, 32K RAM, Basic Language Cartridge, Disk or Cassette

GLOBE MASTER

COMPLETE HI-RES GEOGRAPHY GAME - $29.95

- 8 Hi-Res Color Maps
- U.S.-Europe-World-Asia-Africa-Australia
- Countries-Cities-Capitals-Oceans-Rivers-Mountains, Etc.
- Several Skill Levels

Requires: Atari®800, 32K RAM, Basic Language Cartridge, Disk

ATARI® is a registered trademark of Atari Inc.

MIND BOGGLERS

THREE STRATEGY GAMES

- Capture
- Mystery Box
- Simon Says

CASSETTE **$15.95** *DISK* **$19.95**

Requires: Atari®400, 16K RAM, Cassette
Atari 800, 24K RAM, Cassette or Disk

Versa Computing, Inc.

3541 Old Conejo Road, Suite 104
Newbury Park, CA. 91320 **(805)498-1956**

BASIC RANGE DELETE

by Adrian Dery

Getting tired of deleting BASIC statements one line at a time? This is an Assembly Language program that will delete any number of lines by simply giving it the FIRST and LAST line numbers in the range.

The BASIC program in Listing 1 is easy to use and requires no memory other than Page Six. Just load and run it, first thing after turning on the computer and the Range Delete function is available as long as the power stays on. System Reset, Break and CLOAD's do not affect it, but be careful not to load anything else in Page Six.

The next step is to set up an easy method to access the Assembly program, by entering a line something like:
32767 INPUT FIRST, LAST:X=USR(1536,FIRST,LAST)
Then, from immediate mode, enter:
DEL=32767
Remember that LOAD's and CLOAD's will wipe out line 32767 and a RUN will reset DEL to zero. Therefore you will have to repeat one or both of the above as necessary.

Complete the above steps and you are ready to do any kind of BASIC editing. To delete any number of lines in a range, enter G. DEL from immediate model and BASIC will respond with the ? prompt. Enter the FIRST and LAST Line numbers in the range and all the lines in between will disappear.

Another useful feature of this program is that the USR call can be dynamically executed from a running BASIC program. This makes it a super memory saver if you have a program that uses a lot of memory to initialize strings or memory from literals or DATA statements. Put a USR call at the end of the initialization routine with the FIRST and LAST line numbers of the routine as parameters and the whole routine will be automatically deleted. Just make sure that the USR call, if it's going to be deleted, is on a line by itself or is the last statement on the last line.

One precaution is necessary. The USR call must be on a line number equal to or higher than the highest line to be deleted. The reason is that memory taken up by the deleted lines is reclaimed by the lines above the deleted section. Not only do the lines above the deleted section get moved down into lower memory, but also, a few BASIC internal pointers have to get adjusted by the amount deleted. One of them is the pointer to the current statement being executed, which is the USR call. The amount of Assembly code needed to adjust the BASIC pointer did not seem in line with the advantages. Therefore, the Delete Program assumes that this pointer has to be adjusted and does it.

Listing 2 — Assembly

```
0100 *= 1536
0101 STMTAB =   136
0105 STMCUR =   138
0110 MEMTOP =   144
0115 HIADR =   203
0120 LOADR =   205
0200 ;
0201 ;GET FIRST LINE NUMBER
0202 ;
0205  CLD
0210  FLA
0215  FLA
0220  STA LINNBR+1
0225  PLA
0230  STA LINNBR
0235 ;
0236 ;LOCATE ADDRESS OF
0237 ;FIRST LINE NUMBER
0238 ;
0240  LDA STMTAB
0241  STA HIADR
0242  LDA STMTAB+1
0243  STA HIADR+1
0245  JSR SRCHLN
0260 ;
0261 ;SAVE ADDRESS OF FIRST
0262 ;LINE NUMBER
0263 ;
0265  LDA HIADR
0270  STA LOADR
0275  LDA HIADR+1
0280  STA LOADR+1
0300 ;
0301 ;GET LAST LINE NUMBER
0302 ;PLUS 1
0303 ;AND IT'S ADDRESS
0304 ;
0305  PLA
0310  STA LINNBR+1
0315  PLA
0320  CLC
0325  ADC #1
0330  STA LINNBR
0335  BCC GETTO
0340  INC LINNBR+1
0345 GETTO JSR SRCHLN
0360 ;
```

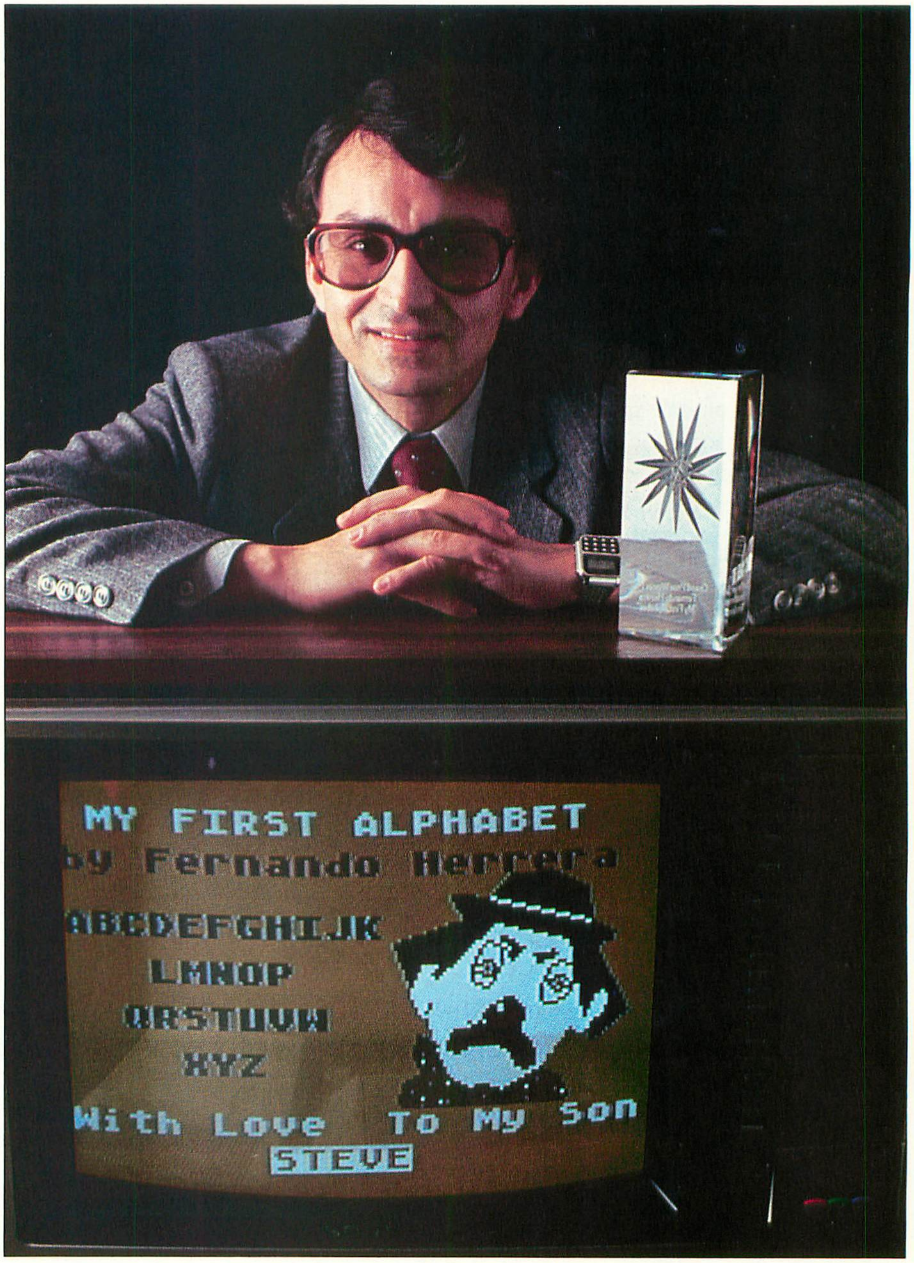
continued on page 44

AN ATARI 800™ HOME COMPUTER AND A FATHER'S LOVE COMBINED TO HELP CHILDREN EVERYWHERE.

Fernando Herrera became the first grand prize winner of the ATARI Software Acquisition Program (ASAP) competition because he believed in computers, his son and himself.

The story of Herrera's success began with his son's sight problems. Young Steve Herrera had been born with severe cataracts in both eyes and, naturally, his father was concerned. Herrera reasoned that the boy's learning abilities could be seriously affected by growing up in a world he could not see.

Having just purchased an ATARI 800 Home Computer, it occured to Herrera that this could be the perfect tool for testing Steve's vision. So he wrote a program simply displaying the letter "E" in various sizes.



Success! It turned out that 2-year-old Steve could see even the smaller "E's" without special lenses. Herrera was first relieved, and then intrigued when he discovered that not only could his son see the "E's," but he would happily play with the computer-generated letters for hours. So Herrera added a picture of an elephant to go with the "E," and then more letters and pictures. Thus, "My First Alphabet" was born, a unique teaching program for children two-years and older consisting of 36 high resolution pictures of letters and numbers.

Herrera submitted the program to the ATARI Program Exchange, where it became an instant best-seller. ATARI was so impressed with the outstanding design, suitability and graphic appeal of "My First Alphabet," that the program is being incorporated into the ATARI line of software.

In addition to his grand prize winnings of $25,000 in cash and an ATARI STAR trophy, Herrera also automatically receives royalties from sales of his program through the ATARI Program Exchange.

But Fernando Herrera wasn't the only software "star" that ATARI discovered. Three other ATARI STARS were awarded at the ASAP awards ceremony for software submitted to the ATARI Program Exchange and

judged by ATARI to be particularly unique and outstanding.

Ron and Lynn Marcuse of Freehold, New Jersey, teamed up to write three winning entries in the Business and Professional category for home computers: "Data Management System," "The Diskette Librarian" and "The Weekly Planner."

Sheldon Leeman of Oak Park, Michigan, captured an ATARI STAR for his exceptionally well-engineered "INSTEDIT" character set editor.

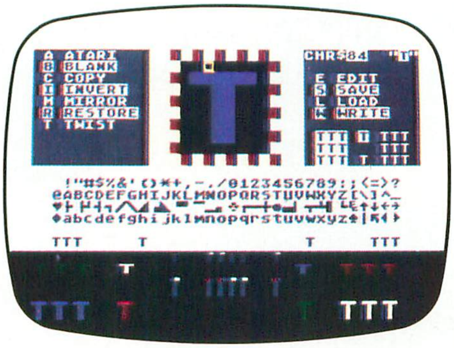
Greg Christensen of Anaheim, California, became our youngest ATARI STAR winner at the age of 17. Christensen designed the clever "Caverns of Mars" game program, which also will be incorporated into the ATARI product line. Greg designed the program in 1½ months after owning his ATARI Home Computer for less than a year.

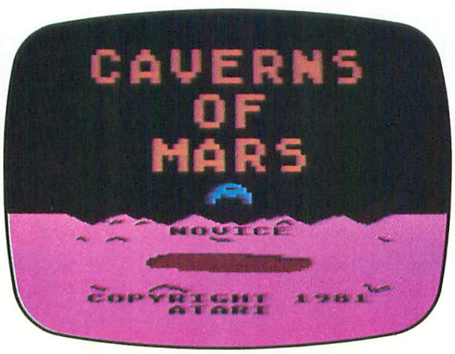
Every three months, ATARI awards ATARI STARS to the writers of software programs submitted to the ATARI Software Acquisition Program and judged first, second and third place in the following categories: Consumer (including entertainment, personal interest and development); Education; Business and Professional programs for the home (personal finance and record keeping); and System Software.

Quarterly prizes consist of selected ATARI products worth up to $3,000, as well as an ATARI STAR, plus royalties from program sales through the ATARI Program Exchange. The annual grand prize is the coveted ATARI STAR trophy and $25,000 in cash.

To be eligible, your software idea must be accepted by the ATARI Software Acquisition Program. Your program can have a broad application or serve a very specific purpose.







After submittal, consultation from ATARI is available if you need personal assistance with sound, graphics, or other technical aspects of your program.

To make your job easier, ATARI provides some 20 software development tools through the ATARI Program Exchange. A list and description of the various system software is published quarterly in the ATARI Program Exchange Catalog. These tools enable you to utilize all the ATARI resources and software, including the six ATARI programming languages.

Fernando Herrera had a great idea that made him a star. ATARI would like to give you the same opportunity.

ATARI®

A Warner Communications Company

Enter the ATARI ASAP competition and you could win $25,000 in cash, royalties, some great prizes and an ATARI STAR.

SUBMIT TO: ATARI® Software Acquisition Program
Dept. C27R, P.O. Box 427,
155 Moffett Park Dr., B-1,
Sunnyvale, CA 94086

OR CALL: 800-538-1862; in California, 800-672-1850.

I'm reaching for the stars. Please send me an entry form today.

Name__________

Address__________

City__________

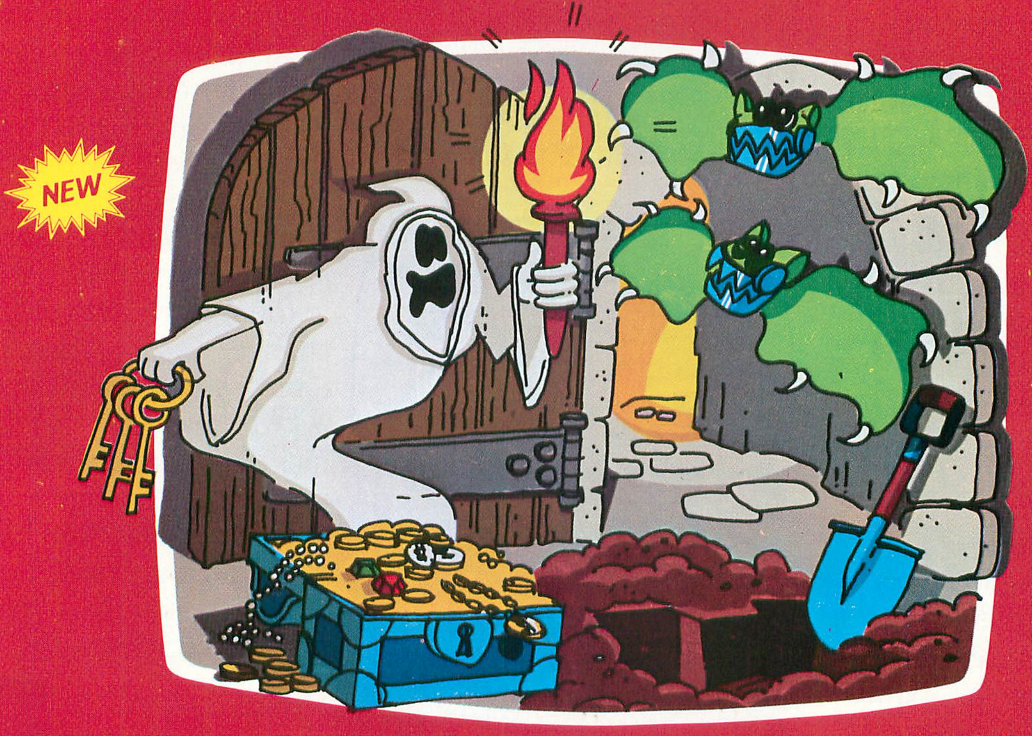
State/Zip__________

ATARI HOME COMPUTERS

We've Brought The Computer Age Home.™

GHOST ENCOUNTERS™

A 16K Assembly Language Real-Time Adventure Game For ATARI® 400/800™ Computer



GHOST ENCOUNTERS™ is the second in a series of real-time, joystick controlled, adventure games following ACTION QUEST,™ presenting a brand new collection of dangers and puzzles. You, as a ghost, travel through a network of 30 rooms in search of valuable prizes while, at the same time, try to survive the many perils encountered. Of course, a mere ghost cannot overcome all the evil powers striving to block his journey. Luckily, you are not a mere ghost, but are equipped with the power of transmutation, allowing you to take on the form of other, sometimes more useful, objects. Who knows when a torch or a hammer might be just what the witch doctor ordered.

Locating all 30 rooms and the 20 prizes scattered throughout requires a player with fast response, physical coordination, and intellectual resourcefulness. Of the 20 prizes, no two can be acquired through exactly identical methods. Regardless of which factors most interest you in a real-time action game, you are sure to find them among the wide variety of challenges located in GHOST ENCOUNTERS.™

Available from your local Atari retailer or send $29.95 in check or money order (California residents add 6½% sales tax) to JV Software Inc.

ALSO AVAILABLE

Don't forget to ask for the original ACTION QUEST,™ with its own unique and imaginative assortment of puzzles, prizes, and perplexing predicaments. Another challenging journey through an entirely different network of rooms and prizes.

Also available in 16K for $29.95 from your local retailer or JV Software Inc.

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JV SOFTWARE, INC

3090 MARK AVE. SANTA CLARA, CA 95051

TRANSLATE

by Jerry White

Those of you who use your ATARI computers for business applications someday might wish to print checks. It seems like a simple task to write a program that prints the date, amount, and payee, in specific locations on a check form. But who wants to enter the English translation of an amount like ONE THOUSAND FOUR HUNDRED SEVENTY EIGHT AND TWENTY THREE CENTS? If you've got to do that much typing, you might as well write your check by hand.

Your computer should be able to perform this task. Unfortunately, the translation of dollars and cents into English isn't as easy as just printing a number. I spent quite a while using the trial-and-error system to provide you with this program. I'm sure there must be a more efficient algorithm than the one I came up with, but this one does the job.

What I did was to store the English versions of the required numbers in the string N$, and the starting and ending locations of each number in the two dimensional array, N. You enter the number in the normal numeric format, and the program does the required translation. The translation subroutine begins at line 130 and ends at line 320. B$ is a string of 80 blanks, EA$ holds the translated English Amount, and AMOUNT$ stores the numeric amount you enter through the keyboard.

The program will tell you what it wants and includes error-handling routines. The BREAK key and SYSTEM RESET have been left operational.

I haven't gone so far as to actually print your checks, but I have taken care of the tricky part. Add your own inputs for date and payee, position your data according to the layout of your check form, and put your ATARI to work. When you actually print checks, please remember that Jerry starts with a "J."

See page 20 for listing.

Variable checksum = 217201

Line num range			Code	Length
100	—	190	YL	547
200	—	300	RO	546
310	—	370	ZO	562
380	—	480	QE	529
490	—	550	CT	545
560	—	570	KF	101

TRANSLATE *listing*

```
100 REM TRANSLATE 5/28/82 by Jerry White for ANTIC Magazine
110 DIM B$(80),N$(152),EA$(80),AMOUNT$(10),N(27,27)
120 EA$=" ":EA$(80)=" ":EA$(2)=EA$:B$=EA$:GOTO 330
130 EA$=B$:EA$=" ":SW=0:FOR ME=1 TO LA
140 IF AMOUNT$(ME,ME)="." THEN EA$(LEN(EA$)+1)="AND ":? "AND ":GOTO 280
150 IF SW=1 THEN SW=0:GOTO 280
160 IF AMOUNT$(ME,ME)="," THEN SW=2:GOTO 270
170 TRAP 280:SW=0:N=VAL(AMOUNT$(ME,ME)):J1=N(N,1):J2=N(N,2):TRAP 40000
180 IF N=0 THEN SW=2:GOTO 280
190 IF LA=ME OR ME=LA-3 OR ME=LA-5 OR ME=LA-6 OR ME=LA-7 THEN 240
200 IF LA=8 AND ME=1 THEN 240
210 IF AMOUNT$(ME,ME)<>"1" THEN 230
220 SW=1:N=VAL(AMOUNT$(ME,ME+1)):J1=N(N,1):J2=N(N,2):GOTO 240
230 N=N+18:J1=N(N,1):J2=N(N,2)
240 EA$(LEN(EA$)+1)=N$(J1,J2):? N$(J1,J2);
250 IF ME=LA-5 AND N<>0 THEN EA$(LEN(EA$)+1)=" HUNDRED":? " HUNDRED";
260 IF SW<>2 THEN EA$(LEN(EA$)+1)=" ":? " ";
270 IF SW=2 THEN EA$(LEN(EA$)+1)="THOUSAND ":SW=0:? "THOUSAND "
280 NEXT ME
290 IF AMOUNT$(LA-1,LA)="00" THEN EA$(LEN(EA$)+1)="NO ":? "NO ";
300 IF AMOUNT$(LA-1,LA)="01" THEN EA$(LEN(EA$)+1)="CENT":? "CENT":GOTO 320
310 EA$(LEN(EA$)+1)="CENTS":? "CENTS"
320 LEA=LEN(EA$):? :? EA$(2,LEA):? #2;EA$(2,LEA):? #2:RETURN
330 N$="ONETWOTHREEFOURFIVESIXSEVENEIGHTNINETENELEVENTWELVETHIRTEENFOURTEENFIFTE
ENSIXTEENSEVENTEEN"
340 N$(LEN(N$)+1)="EIGHTEENNINETEENTWENTYTHIRTYFORTYFIFTYSIXTYSEVENTYEIGHTYNINET
Y"
350 DATA 1,3,4,6,7,11,12,15,16,19,20,22,23,27,28,32,33,36,37,39,40,45,46,51,52,5
9,60,67,68,74,75,81,82,90
360 DATA 91,98,99,106,107,112,113,118,119,123,124,128,129,133,134,140,141,146,14
7,152
370 GRAPHICS 0:POKE 82,2:POKE 83,39:POKE 710,160:POKE 752,1
380 ? :? "    This program translates numeric"
390 ? :? "dollar and cent amounts into English."
400 ? :? "Input must be numeric so do not enter"
410 ? :? "dollar signs.  Always include decimal"
420 ? :? "point between dollars and cents, and"
430 ? :? "a comma between the thousand and the"
440 ? :? "hundred columns when the amount is"
450 ? :? "greater than 999.99."
460 FOR J=1 TO 27:READ J1,J2:N(J,1)=J1:N(J,2)=J2:NEXT J
470 ? :? "    Make sure your printer is ready,":? :? "then press START."
480 IF PEEK(53279)<>6 THEN 480
490 TRAP 560:CLOSE #2:OPEN #2,8,0,"P:":TRAP 40000:POKE 752,0:? CHR$(125)
500 ? :? "Enter numeric amount or just press":? :? "the RETURN key to quit";
510 INPUT AMOUNT$:LA=LEN(AMOUNT$):IF LA=0 THEN 570
520 TRAP 550:IF LA<4 OR LA>9 OR AMOUNT$(LA-2,LA-2)<>"." THEN 550
524 IF LA<7 THEN 530
525 IF LA>6 AND AMOUNT$(LA-6,LA-6)<>"," THEN ? CHR$(253):? "A , MUST SEPERATE TH
OUSANDS,HUNDREDS":GOTO 500
530 TRAP 40000:? CHR$(125):? :? "CONVERTING $";AMOUNT$:? :? #2;"$";AMOUNT$
540 GOSUB 130:GOTO 500
550 ? CHR$(253):? ,"INVALID AMOUNT":GOTO 500
560 ? CHR$(253):? "    READY PRINTER THEN PRESS START":GOTO 480
570 GRAPHICS 0:? :? "BASIC":? "IS";:END
```

the margins if you use 10 CPI. I understand that the newest versions of both TEXT WIZARD and LETTER PERFECT also allow special control codes to be used, but ASK to be sure. Don't be afraid to call the manufacturers of both products. If they can't answer the question of compatibility you shouldn't purchase the product.

OK, So Which Printer Is For Me??

That is a question that can be answered only by a careful review of your current and future needs. If you are a programmer and need little more than good quality but high speed printouts, then you have a very wide selection. All of the printers seemed to fit that bill, with the OKIDATA providing the fastest by a good margin. If you are likely to do a lot of word processing, then you will have to look more carefully at several features. First, compatibility with the word processors. The ATARI word processor, for example, has the ability to send printer control codes from within the body of your text. This simply means that you can address most features of a given printer without expecting too many problems. TEXT WIZARD has added the NEC 8023A-C to its compatibility list which allows an alternative to ATARI 825 for proportional print. I now use this combination more than any other because I really like the NEC printer, and TEXT WIZARD allows right margin justification. LJK claims that their new version of LETTER PERFECT can accommodate any printer. We have not tested this product yet, so cannot verify the claim.

Graphics are more commonly standard equipment and the only thing lacking is good software. Macrotronics produces a cable and software combination that allows graphics on a few other machines, but seems overpriced. The graphics capabilities are there, but the software is not yet abundant, so keep your eyes open for new entries.

Printer choice is a tough one because most of the printers are substantially better than was available as little as a year ago. Your best bet is to review your needs, list your favorite programs that require a printer, consult the comparison chart accompanying this article, and narrow down your choices. Then if you can get some hands-on exposure to a couple of the remaining contenders, you may find that the decision is made for you.

See page 62.

TWO MORE PRINTERS

ALPHACOM MODEL 42

by Jim Capparell

The Alphacom 42, at $199.00 is the least expensive printer I have found. It works as advertised right out of the box. The cable does cost extra ($20.00), but is probably worth it unless you've made cables in the past. It connects to the printer port of your 850 interface with no hassle.

The printer has a self-test feature, which can be used to verify proper operation. There is also a DIP switch hidden, but accessible, which allows control of the auto-wrap feature, selection of right or left justification, and use in a parallel or serial mode.

The advantages, other than cost, are speed (2 lines per second), quiet (it's thermal), and ease of use. It is also reliable. This particular mechanism has been used by Olivetti in calculators since about 1974 with very few problems. There are only six major moving parts and the thermal head is replaceable with an estimated life of well over 1,000,000 lines. Service, if needed, is available through Alphacom and they promise about one week turn around.

The current unit is also available in a faster, 4-lps model for $299. Both units include an auto-wrap around mode. Lines longer than 40 columns are automatically printed on the next line. These units also print graphics. I have yet to use the graphics capability since this requires some software and study of the documentation. I should mention that the documentation seems more than adequate.

The ALPHACOM 42 is a thermal printer requiring special paper (available for $12.00 / box of 4 rolls). Each roll prints about 10,500 lines. Paper is available in either blue or back print. Use black if you intend to xerox your listing. The paper can fade or discolor in strong sunlight. One disadvantage is that this printer is only 40 columns. Although perfect for listings, it is really not sufficient for letters.

I find that due to its speed I use the printer for getting a listing quick. I also have found that I can get a fast working draft of letters. The advantage is speed and quiet.

For those of you on a limited budget you can't go wrong at $200.00

Printer available from:
Alphacom
2323 So. Bascom Ave.
Campbell, CA 95008
(408) 559-8000

SMITH-CORONA TP-I

by Matt Loveless

The new letter quality printer from Smith-Corona, the TP-I, is a remarkable value for small business and personal applications. It is a typewriter-quality, daisy-wheel printer costing less than $900. That makes the TP-I a printer well worth considering. Combine this printer with your word processor and you will suddenly be able to produce professional looking documents in your own home.

The TP-I supports many formatting features. You have the ability to set, under software control, such things as the right margin, left margin, and tab stops. In addition to this, by moving a selector switch on the printer, you may manually choose line spacings of 1, 1½, and 2. These built in features allow you go get impressive looking documents with even the most rudimentary word processor.

Another nice feature is the automatic page advance. This switch, when enabled, allows the printer to automatically skip over page breaks. When the end of a sheet of continuous paper is reached, the printer will automatically advance over the perforation. This feature is superfluous since the TP-I is friction-fed, and cannot yet handle continuous form paper. Smith-Corona promises continuous form capability soon.

One of the nicer attributes of the printer is the ability to switch print wheels. This allows you the option of printing in more than one font or print style. Some other positive features of the printer include auto underscore, and a backspace code for slashing zero's and other characters. Additionally, ribbon cassettes are the same as those used in typewriters and are readily available.

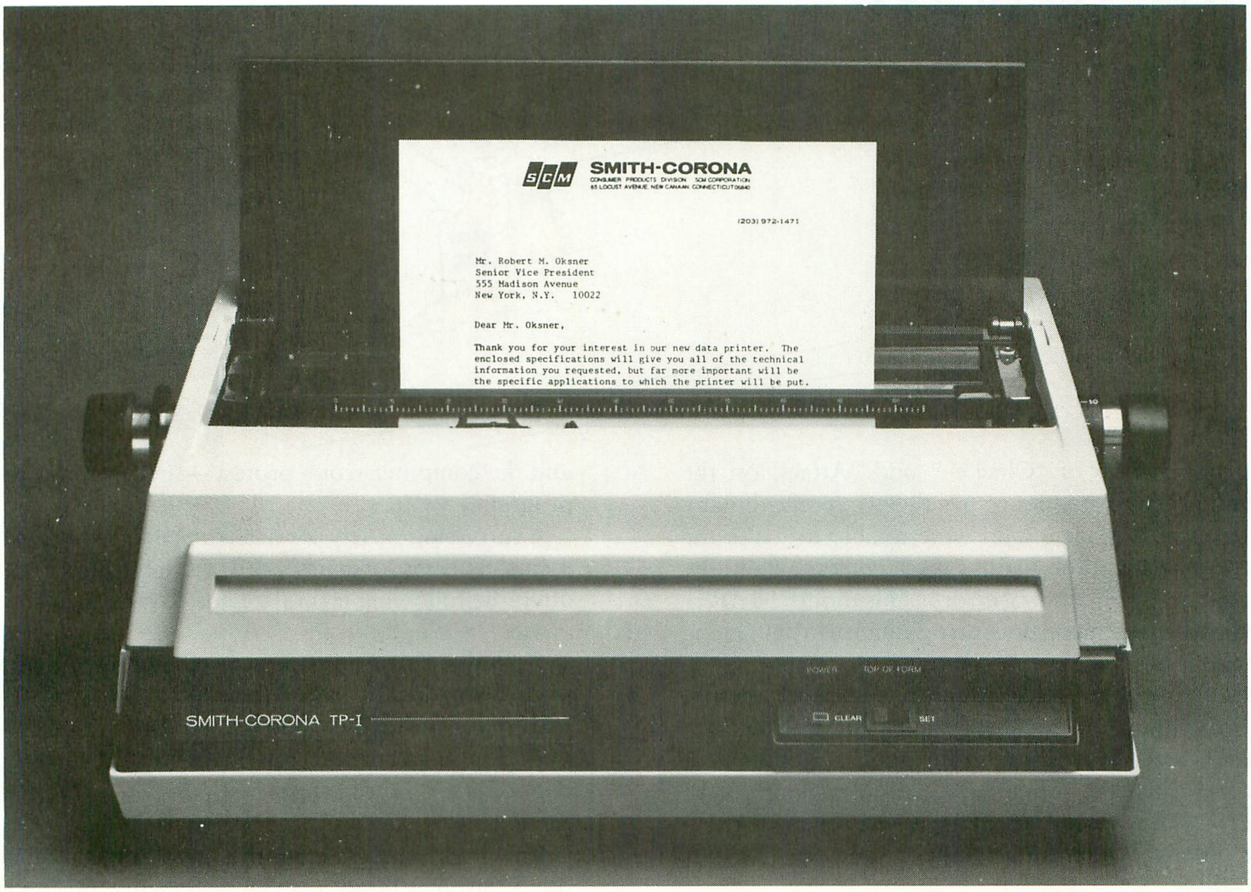
The TP-I does have some flaws, though. Because it is a letter quality printer, it is very slow (12 cps), and therefore is not good for such things as program listings. In addition it is noisy. The cooling fan runs continuously.

The TP-I was tested with the Atari Word Processor because of its ability to send control codes to the printer via its "CTRL-INS" option. The TP-I is possibly compatible with other word processors, but because of constant upgrades, check with the word processor manufacturer for compatibility questions.

The TP-I is a very sound and affordable letter quality printer. Although you do sacrifice functions that the more expensive letter quality printers possess, you do not sacrifice print quality. The TP-I is a welcome addition to the Atari compatible products.

Printer available from local dealer or:
Smith-Corona
65 Locust Ave.
New Canaan, CT 06840

Smith-Corona introduces the only daisy wheel printer under $900* for your Atari.®



You're putting together a desktop computer system for your office or home. And you want to add a letter quality printer so you can do word processing, too. But you don't want to spend a fortune.

Until now, you really had little choice but to settle for dot matrix printers. True, a dot matrix doesn't produce letter-perfect printing, but daisy wheel printers just cost too much. That is, they did.

Now, Smith-Corona® offers a daisy wheel printer at such an incredibly low price, you can't afford *not* to get it. (The fact is, you won't find a daisy wheel printer *anywhere* at a price so low.)

The Smith-Corona TP-I™ printer operates with microprocessor controlled daisy wheel technology, and is available with either standard serial or parallel data interface. It is compatible with your Atari. And, unlike many printers currently on the market, it's made in America.

Best of all, the TP-I produces results identical to those of our very finest office typewriters—printing with real character. So it can be used to send out letters that have to look perfect. As well as financial statements, inventory reports, direct mail campaigns, manuscripts. Even a letter to your son in college! Anything at all you need printed.

The basic TP-I will handle letter or legal sized paper. An option that will be available soon will enable it to handle either fanfold or single sheet paper.

The TP-I is easy to use—just turn the power on, load the paper, and away it goes. There are drop-in ribbon cassettes and a choice of easy-to-change, snap-on daisy print wheels for a variety of fonts.

So stop thinking you can't afford a daisy wheel printer. Because, thanks to Smith-Corona, a printer with real character is no longer expensive.

Smith-Corona

Please send me more information on the Smith-Corona TP-I daisy wheel printer.

Name__________

Title__________

Company Name__________

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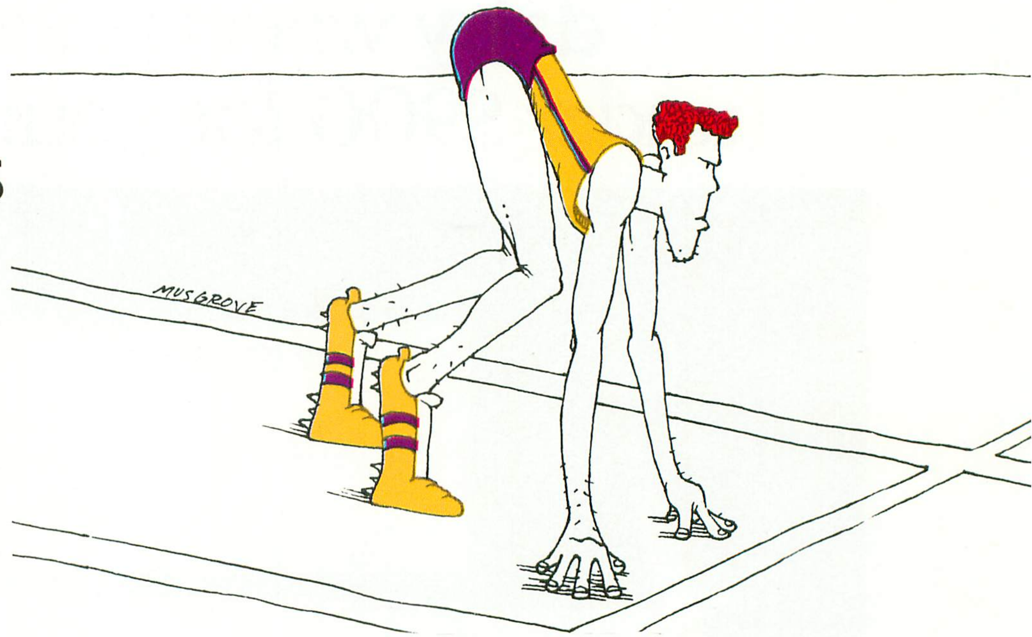
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OH THOSE BUGS

by David Plotkin



After the publication of "Chicken" and "Attack on the Death Star" in the past issues of ANTIC we received many calls from puzzled readers who were unable to make the programs run. Since both listings were correct, we know many of you need help finding errors. This month STARTING LINE will give some elementary guidance in debugging BASIC programs.

The most important advice we can give is: never attempt to run a program prior to saving a copy on disk or tape. Should your newly typed program contain a fatal error it may possibly cause the computer to fail to respond to the keyboard. This forces you to turn the power off and then on again in order to reset, erasing computer memory and your program.

We assume you've corrected your normal typing errors, those which generate an error message when you press RETURN after a line. The remaining errors are more subtle and are not reported until the computer tries to execute the program.

Such things as NEXT with no FOR or a RETURN with no GOSUB are generally the result of a missing line. Tracing back through the program to the line where the command should be, is fairly straightforward. More difficult are the errors which are not actually in the line the computer indicates. You have to know where else to look for the error. Most notorious of these are errors which result from mistyping a DATA statement.

MOST ERRORS IN TYPED COMPUTER PROGRAMS STEM FROM DATA STATEMENTS. There are logical reasons for this. Human beings are not very good at duplicating long strings of numbers and/or letters separated by commas. Numbers get transposed or dropped, commas get left out or periods are substituted for them. Secondly, the computer does not check DATA statements during input. You can put *anything* in a DATA statement and the computer won't protest — until you try to run the program.

A surprising variety of errors can be traced to DATA statements. There is, of course, "OUT OF DATA" (Error 6), but often the following errors are due to DATA errors:

1. Value Error (outside a specified range; Error 3)
2. String length error (Error 5)
3. Number greater than 32767 (Error 7)
4. Input statement error (Error 8)
5. Cursor out of range (Error 141)

It is true that these error messages can also be caused by other mistakes besides DATA statements. OUT OF DATA and CURSOR OUT OF RANGE can be caused by an error in the parameters of a FOR-NEXT loop. Often there will be a series for FOR-NEXT loops in a program, and an error in typing the parameters of one FOR-NEXT loop won't be detected until one of the following loops is executed. A STRING LENGTH error may be the result of mistyping the DIM statement. In general, this is not detected until you try to define or use a portion of the string past the dimensioned length.

Knowing that such a wide range of errors can indicate a mistyped DATA statement is half the battle. Finding out which DATA statement can be difficult because the computer reports the error as occurring in the line containing the READ statement. Thus, if line 10 says (in part), "READ X, Y: PLOT X, Y" followed by lines of DATA statements, any data error will be reported as occuring in line 10, even though line 10 is typed in perfectly! The problem of finding the erroneous DATA statement is somewhat simplified if each READ statement is followed by its DATA statements.

There are other ways to isolate the problems. One way is

continued on page 26

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to check the line where the error is reported and ask the computer to print the value of the READ variable. Often the READ statement is executed in a FOR-NEXT loop, and you can ask the computer to print the value of the loop variable. For example, let's look at the following BASIC program:

```
10 DIM A$ (10)
20 FOR N = 1 to 10: READ Q: A$ (N,N) = Q: NEXT N
30 DATA 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
40 FOR M = 1 TO 5: READ X, Y, Z: PLOT X, Y:
   POKE 256 + M, Z: NEXT M
50 DATA 10, 20, 24, 30, 40, 24, 50, 60, 24, 70, 80, 24,
   90, 100, 25
```

Suppose you accidentally typed A$(5) instead of A$ (10) in line 10. You'll get the error message "ERROR 5 on Line 20". This is an example of a "misleading" error message. Next, suppose you made "8, 9" into "8.9" in line 30, by substituting a period for a comma. You'll get the message "ERROR 6 on line 40". Line 40? What's going on here? When line 20 is trying to READ Q ten times (N = 1 to 10), it runs out of data on line 30 because 8.9 is one data item, while 8, 9 is two. The computer gets the first data item on line 50. When line 40 executes, it starts reading at the second data item on line 50 and, consequently, runs out of data.

The first thing to do is type in (direct mode) PRINT M. The computer responds with 5. So you can tell that line 40 did not finish executing, because if it had, the computer would respond with 6 — one *more* than the loop limits. Counting off the data items in line 50 reveals that the last values of X, Y, and Z should be 90, 100, and 25 respectively. Typing in PRINT X, Y, Z causes the computer to respond with 100, 25, and 90. Everything is off by one data item, but line 50 is typed in perfectly. Now go back to the READ statement executed on line 20 and type in PRINT Q. The computer responds with the last value of Q, 10. That's right, so you look at line 30 to find your error.

Leaving out commas is an easy way to get CURSOR OUT OF RANGE, VALUE ERROR, and INPUT STATEMENT ERROR. Leaving out the comma between 10 and 20 on line 50 would cause the computer to try to plot 1020, 24 — a non-existent position off the screen. Leaving out the comma between 24 and 30 would cause the computer to try to POKE the number 2430 into memory. Since 255 is the largest number a memory location can contain, this will also generate an error.

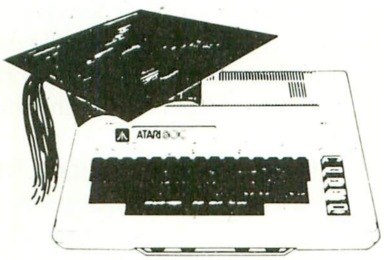
Finally, make sure that after you have made corrections and deletions that you press System / Reset. Sometimes errors cause critical memory locations to change in such a way that even error free programs cannot run. Prior to every test run press System / Reset. Of course once your program runs correctly this is not necessary.

[For further help in getting your programs to run see TYPO this issue—Ed.]

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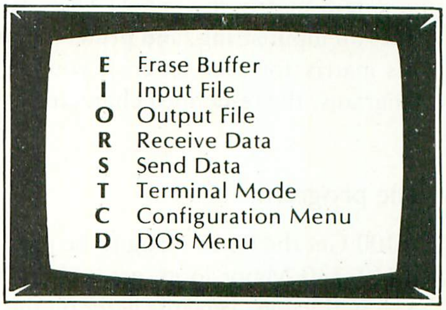
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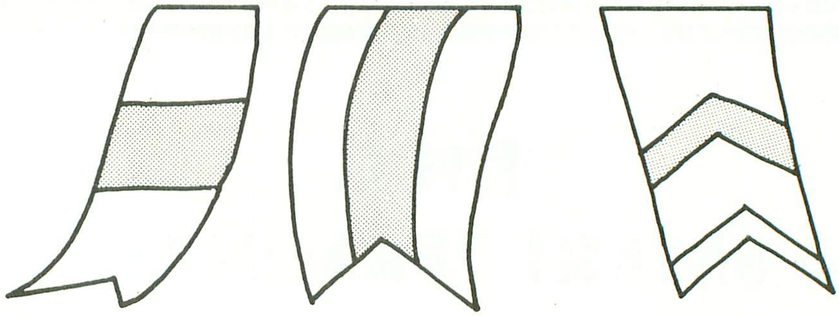
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BANNER MAKER

by Paul E. Hoffman



The following program allows you to make banners on most common printers. Although the program is short, it shows how to use a few ATARI features.

As you may know, each letter on your screen is formed in an 8 × 8 matrix in your ATARI's memory. This program takes an input string, and prints out an enlarged version of this matrix for each letter. If you use any font generating programs, the re-defined characters will be printed out.

The program:

100 Get the input string to be printed as the banner.

110–130 Major loop: get a character and determine its ATASCII value. Type the letter on the screen so you can tell how far along the banner is.

140–170 Calculate which group the current character is in, and translate CH into the keycode.

200 Loop to retrieve the eight bytes for each character, Y being the row of the character received. CHBAS, determined in line 1030, is the page where the character table begins, and CH is the character offset in the table.

210–220 Within each byte, determine which bits are set to 1 by comparing the byte to powers of two (see line 1040) in descending order from 128. If the bit is on, subtract that power of two from the byte so that the next bit may be tested. BITON (and each element of ARR) will either equal 0 or 1, depending on the value of each bit in our BYTE.

Note that line 220 tells us to put our result into the array vertically, starting in the upper right corner, a clockwise rotation of 90 degrees. You can change the rotation with the following changes:

Letter facing:	Array:
Same as font	ARR(C7—X,Y)
90 deg Clockwise	ARR(C7—Y,C7—Y)
180 deg Clockwise	ARR(X,C7—Y)
270 deg Clockwise	ARR(Y,X)

230 Get next byte.

500 Print the letter in the array. Our FOR-NEXT loops read the matrix horizontally from the top to the bottom. We must also initialize the LINE$ to be printed to spaces.

510–530 If the array element is a 1, change a segment to blocks (solid print elements, see line 1100), if it is a 0, do nothing. Loop for each bit in the row.

540–550 Print the LINE$ and loop back for the NEXT ROW.

560–600 Check if you want to go to a new page for each letter; if so, print a formfeed character. Either way, get the next character.

1030 Locate the character set in memory. This will be page 224 if it is the ATARI character set, otherwise this will point to the beginning of your set.

1040 Set up the BIT array.

1050–1080 These are variables you can set to change the printer's output. WIDTH is the number of times each segment is copied vertically (how thick it will be); SEGHT is the number of characters each element in the array will take up. For most printers, WIDTH should be about half of SEGHT, but you can get interesting results by varying this ratio.

**PRTYPE$** holds the type of printer, so that the BLOCK$ and BLANK$ will correspond correctly to your printer. PAGE$ tells whether you want a page eject after each character or not. Most of the time you will not, but it allows you to sheet-feed your printer if you want.

SIXROW$ should be YES if you are using the ATARI character set. It will truncate the top and bottom bytes, which are zero anyway, and increase your SEGHT by the proportionate amount on 1140.

1100–1120 Sets the correct character values based on the printer type.

1130 Gives COLLOW and COLHIGH their initial values, which correspond to reading the entire 8 bytes of the character.

1140 If each character is actually just the middle six bytes from the font, it increases the segment height by 25%, and adjusts the parameters for the FOR-NEXT loop that starts on line 500.

1150–1170 Make the string BLOCK$ of block characters, length equal to SEGHT. Make the string BLANK$ be blanks, length 8*SEGHT (8 segments to a character).

The program can be tailored to your system by changing lines 1050–1080, or by adding another line if you have a printer that is not mentioned in lines 1100–1120. You can determine the character for BLOCK by finding the character in the printer set which is the most filled in. For non-graphic printers, this is usually the pound sign (#). The blank is usually just a space character, ASCII 32.

Printing graphics characters takes about 3.5 times as long as non-graphic ones since the printer must make two passes on the line it is printing. It thus loses its bidirectional printing capability. Graphics characters print much darker, and make a much more readable banner.

continued on page 30

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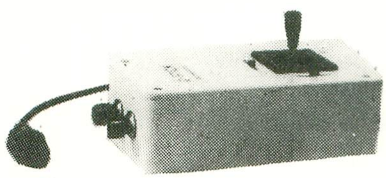
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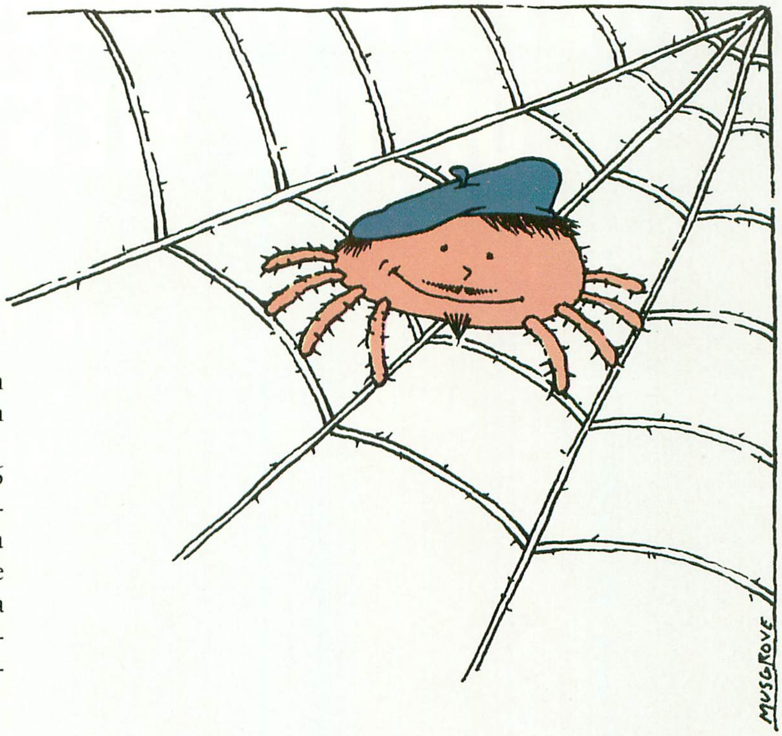
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```
10 REM Banner maker by Paul E. Hoffman
20 GOSUB 1000:REM Get initial values, and setup varibles
100 PRINT "String for banner";:INPUT INSTR$
110 FOR CHNUM=C1 TO LEN(INSTR$)
120 CH$=INSTR$(CHNUM):CH=ASC(CH$)
130 PRINT CH$;
140 CHGRP=INT(CH/C32)+C1
150 ON CHGRP GOTO 160,170,170,200,160,170,170,200
160 CH=CH+64:GOTO 200
170 CH=CH-C32:GOTO 200
200 FOR Y=C0 TO C7:BYTE=PEEK(256*CHBAS+8*CH+Y)
210 FOR X=C7 TO C0 STEP -1:BITON=C0:IF BYTE>=BIT(X) THEN BITON=C1:BYTE=BYTE-BIT(
X)
220 ARR(C7-Y,C7-X)=BITON:NEXT X
230 NEXT Y
500 FOR ROW=C0 TO C7:LINE$=BLANK$:FOR COL=COLLOW TO COLHIGH
510 IF ARR(COL,ROW)=C1 THEN LINE$(SEGHT*COL)=BLOCK$
530 NEXT COL
540 FOR I=C1 TO WIDTH:LPRINT LINE$:NEXT I
550 NEXT ROW
560 IF PAGE$="YES" THEN LPRINT CHR$(140)
600 NEXT CHNUM
999 END
1000 REM ***** Subroutine for setup of variables
1010 C0=0:C1=1:C3=3:C7=7:C8=8:C32=32:C63=63
1020 DIM ARR(C7,C7),BIT(C7),INSTR$(C63),CH$(C1),LINE$(80),PRTYPE$(C7),PAGE$(C3),
SIXROW$(C3)
1030 CHBAS=PEEK(756)
1040 TEMP=C1:FOR I=C0 TO C7:BIT(I)=TEMP:TEMP=TEMP*2:NEXT I
1050 WIDTH=5:SEGHT=10
1060 PRTYPE$="EPSON"
1070 PAGE$="NO"
1080 SIXROW$="NO"
1100 IF PRTYPE$="EPSON" THEN BLOCK=35:BLANK=C32
1110 IF PRTYPE$="ATARI" THEN BLOCK=160:BLANK=C32
1120 IF PRTYPE$="LETQUAL" THEN BLOCK=35:BLANK=C32
1130 COLLOW=C0:COLHIGH=C7
1140 IF SIXROW$="YES" THEN SEGHT=INT(SEGHT*1.25):COLLOW=C1:COLHIGH=6
1150 DIM BLOCK$(SEGHT),BLANK$(8*SEGHT)
1160 FOR I=C1 TO SEGHT:BLOCK$(I)=CHR$(BLOCK):BLANK$(I)=CHR$(BLANK):NEXT I
1170 FOR I=C1 TO C3:BLANK$(LEN(BLANK$)+1)=BLANK$:NEXT I
1200 RETURN
```

Variable checksum = 1528295

Line num range		Code	Length
10	- 220	NH	373
230	- 1020	YW	314
1030	- 1150	XC	315
1160	- 1200	EM	80



SPIN COLORS WITH THE SPIDER

by John and Mary Harrison

Since our new ATARI 800 has the GTIA chip, we have been experimenting with it. SPIDER is a little BASIC program that lets you doodle colors with your joystick.

Mode 11 is our choice for this program because it gives 16 different colors in a high resolution mode (80 pixels horizontally by 192 vertically). When you run the program, a white "spider" appears. The "fire" button changes the spider's color. As you move the joystick the spider leaves a trail of its color. When the spider is white it can be positioned without leaving a line. (It actually draws in background color).

To start a new design, press RESET and type RUN.

```
10 REM ***************************
20 REM *          SPIDER         *
30 REM * JOHN AND MARY HARRISON *
40 REM *          6/82           *
50 REM ***************************
60 DIM SPIDER$(1),SSPIDER$(8),ERASE$(10)
70 REM SET ASIDE MEMORY FOR PLAYER
80 REM AND SET GRAPHICS MODE.
90 MEMTOP=PEEK(106)-16
100 POKE 106,MEMTOP
110 REM CLEAR MEMORY FOR PLAYER
120 POKE 88,0:FOR I=0 TO 4:POKE 89,MEMTOP+8+I:? CHR$(125):NEXT I
130 GRAPHICS 11
140 MEMTOP=MEMTOP+8
150 REM START OF PLAYER MEMORY
160 POKE 54279,MEMTOP
170 REM DECIMAL ADDRESS OF PLAYER MEMORY
180 PMBASE=256*MEMTOP
190 REM SINGLE LINE PLAYER DOUBLE WIDTH
200 POKE 559,46:POKE 53256,1
210 REM ENABLE PM GRAPHICS
220 POKE 53277,3
230 REM INITIAL PLAYER POSITION
240 XSPIDER=119
250 YSPIDER=48
260 REM CLEAR STRING FOR VERITCAL MOVEMENT
270 ERASE$=""
280 REM POSITION PLAYER
290 POKE 53248,XSPIDER
300 REM DRAW PLAYER
310 FOR I=PMBASE+511+YSPIDER TO PMBASE+518+YSPIDER
320 READ DAT
330 POKE I,DAT
340 NEXT I
350 DATA 36,36,90,60,60,90,36,36
360 REM ADDRESS OF ARRAY AND VARIABLE
370 REM TABLES. THIS SECTION OF CODE
380 REM ALLOWS YOU TO USE 128 BYTES
390 REM FOR SPIDER$ WITHOUT RESERVING
400 REM THAT MUCH MEMORY IN THE DIM.
410 ATAB=PEEK(140)+256*PEEK(141)
420 VTAB=PEEK(134)+256*PEEK(135)
430 OFFSET=256*MEMTOP+512-ATAB
440 M3=INT(OFFSET/256)
450 M2=OFFSET-256*M3
460 POKE VTAB+2,M2:POKE VTAB+3,M3
470 POKE VTAB+4,128:POKE VTAB+5,0
480 POKE VTAB+6,128:POKE VTAB+7,0
490 REM SET UP SHADOW FOR SPIDER
500 SSPIDER$(1,8)=SPIDER$(YSPIDER,YSPIDER+7)
510 REM INITIALIZE COLOR AND LINE CO-
520 REM ORDINATES.
530 C=0:XLINE=39:YLINE=69
540 SETCOLOR 4,0,8:POKE 704,8
550 GOSUB 880
560 COLOR C
570 PLOT XLINE,YLINE
580 REM CHANGE COLOR ROUTINE
590 IF STRIG(0)=1 THEN 660
600 C=C+1
610 IF C>15 THEN C=0
620 COLOR C:POKE 704,C*16+8
630 FOR DEL=1 TO 20:NEXT DEL
```

continued on page 49

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by John Anderson



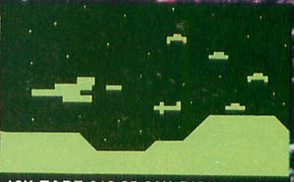
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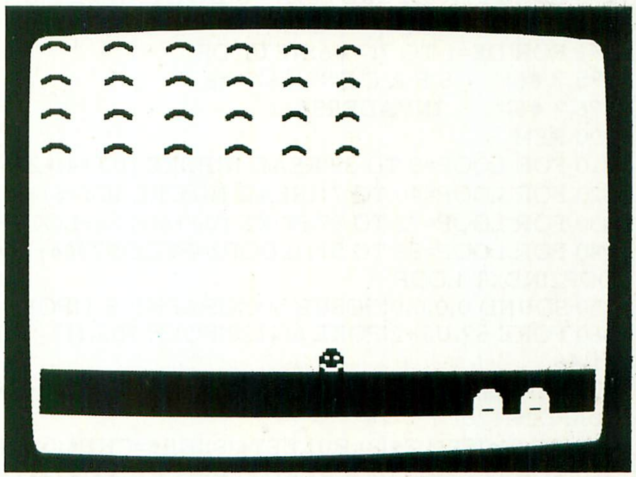
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PAC INVADERS

by Vince Scott



PAC INVADERS combines familiar characters from PAC-MAN and the scenario of SPACE INVADERS. You need 16K and a joystick and then lots of practice. Vince makes good use of re-defined characters set graphics. The action is relatively fast and the response time good (remember this is a BASIC program). This game could be customized into your very own version of a very popular arcade game. Let us know what you do with it!

```
1 REM PAC-INVADERS BY VINCE SCOTT
2 REM FOR ANTIC MAGAZINE VOL 1, #3
6 REM ----------------------------
10 LOOP=0:LOOP2=0:TALLY=0:KILL=0:GOSUB 280:GOTO 140
30 BHG=PEEK(53248):IF BHG>0 THEN GOSUB 210
40 IF LA=1 THEN BG=BG-4:VC$(BG)=BULLET$:POKE 53278,1:IF BG-4*O<10 THEN VC$(BG,BG+4)=BH$:LA=0
50 BHG=PEEK(53248):IF BHG>0 THEN GOSUB 210
60 IF BF=1 THEN SAW=SAW+3:VC$(SAW)=MISSILE$:IF SAW>102 THEN VC$(SAW,SAW+5)=BH$:BF=0:SAW=20
70 IF PEEK(53259)=1 THEN 250
80 IF BF=0 AND TALLY>KILL AND O<16 THEN BF=1:POKE 53255,DX+3:SAW=14+4*O:TALLY=0
90 DX=DX+4*(STICK(0)=7)-4*(STICK(0)=11):POKE 53248,DX
100 IF STRIG(0)=0 AND LA=0 THEN LA=1:DXM=DX+2:POKE 53252,DXM:BG=94:VC$(BG)=BULLET$:POKE 77,0
110 TALLY=TALLY+1:RETURN
120 POKE 656,1:POKE 657,2:? "YOU LOSE-PUSH TRIGGER TO PLAY AGAIN";:SOUND 0,0,0,0:TURNS=0:WAVES=0
130 POKE 656,1:POKE 657,2:POKE 704,PEEK(710)
135 IF STRIG(0)=1 THEN 135
137 POKE 752,1:? "}"
140 POKE 656,3:POKE 657,2:? "POINTS    ";:SCORE=0:GOSUB 240:POKE 705,88:POKE 706,88:KILL=80:HARD=0:HA
RDER=0
150 POKE 704,82:VC$=BH$:LA=0:BF=0:POKE 53278,1:FOR LOOP=1 TO 8:FOR LOOP2=80 TO 150 STEP 2:SOUND 0,
LOOP2,10,6
155 NEXT LOOP2:NEXT LOOP:TALLY=80:SOUND 0,0,0,0
160 POKE 77,0:KILL=KILL-WAVES*10:IF WAVES>1 THEN HARD=30:IF WAVES>3 THEN HARDER=60
170 FOR O=1 TO 20:HU=-HU:FOR LOOP=0 TO 8:KZ=PEEK(OE)-HU-20*(LOOP=8):M=PEEK(XD)-(KZ<0)+(KZ>255):KZ=
KZ+256*(KZ<0)-256*(KZ>255)
180 GOSUB 30:POKE XD,M:POKE OE,KZ:GOSUB 30:POKE 756,UJ+4+2*(PEEK(756)=UJ+4):GOSUB 30+HARD
190 SOUND 0,255,10,15:GOSUB 30+HARDER:SOUND 0,0,0,0:NEXT LOOP:NEXT O
200 GOSUB 420:VC$=BH$:LA=0:BF=0:POKE 53278,1:GOTO 120
210 SOUND 0,255,6,10:N=DXM+8*LOOP*(-HU)-64*(HU<0)-48:N=2*(INT(N/16)):BHG=(BHG=2)+3*(BHG=1)+5*(BHG=
8)+7*(BHG=4)-1
211 SOUND 0,255,6,6
220 SCORE=SCORE+10*(10-BHG):SHOTS=SHOTS+1
222 IF SHOTS=24 THEN POP :VC$=BH$:WAVES=WAVES+1:SOUND 0,0,0,0:GOSUB 420:GOTO 150
225 SOUND 0,255,6,4
230 POSITION N,BHG:? #6;"  "
240 POKE 656,3:POKE 657,8:? "  ";SCORE;"        ";:VC$(BG,BG+2)=BH$:LA=0:POKE 53278,1:SOUND 0,0,0,0:RETUR
N
250 POKE 706-TURNS,0:POKE 704,PEEK(710):VC$=BH$:FOR O=70 TO 0 STEP -1:SOUND 0,220,8,O/5:NEXT O:GOS
UB 420
260 TURNS=TURNS+1:IF TURNS=3 THEN TURNS=0:SCORE=0:GOTO 120
270 GOTO 150
```

```
280 UJ=PEEK(106):IF UJ/2=(INT(UJ/2)) THEN UJ=UJ-8
290 POKE 89,UJ:POKE 88,0:? CHR$(125):POKE 89,UJ+3:? CHR$(125):POKE 106,UJ:GRAPHICS 18:POKE 756,(UJ+4
)
291 FOR DE=1 TO 7:? #6:NEXT DE
295 ? #6;"     S P A C E":? #6:? #6
296 ? #6;"     INVADERS"
300 REM
310 FOR LOOP=8 TO 39:READ N:POKE (UJ+4)*256+LOOP+32,N:NEXT LOOP
320 FOR LOOP=40 TO 71:READ N:POKE (UJ+6)*256+LOOP,N:NEXT LOOP
330 FOR LOOP=72 TO 87:POKE (UJ+6)*256+LOOP-72,0:NEXT LOOP
340 FOR LOOP=88 TO 511:LOOP2=PEEK(57344+LOOP):POKE (UJ+6)*256+LOOP,LOOP2:POKE (UJ+4)*256+LOOP,L
OOP2:NEXT LOOP
350 SOUND 0,0,0,0:GOSUB 500:GRAPHICS 1:POKE 559,34:XD=PEEK(560)+PEEK(561)*256+5:OE=XD-1
360 POKE 89,UJ+2:POKE 88,128:POKE 752,1:? " ":POKE XD+25,7:POKE 708,46:POKE 709,46:POKE 710,46:POKE 7
11,46
370 DIM BH$(128),GF$(1),RR$((INT(ADR(GF$)/1024)+1)*1024-ADR(GF$)-1),PLAYER$(384),VC$(128),P$(128),PL1$(1
28),PL2$(128)
380 DIM MISSILE$(8),BULLET$(8):BH$=CHR$(0):BH$(128)=CHR$(0):BH$(2)=BH$:P$=BH$:VC$=BH$:BG=88
390 FOR LOOP=1 TO 8:READ O,BHG,HU:P$(97+LOOP,97+LOOP)=CHR$(O):BULLET$(LOOP,LOOP)=CHR$(BHG):MIS
SILE$(LOOP,LOOP)=CHR$(HU):NEXT LOOP
400 PL1$=BH$:PL2$=BH$:PL1$(12)=P$:PL2$=PL1$:POKE 53249,185:POKE 53250,171:POKE 704,196:POKE 707,76
410 SAW=10:POKE 53254,100:DX=128:POKE 53248,DX:POKE 54279,ADR(PLAYER$)/256:POKE 623,1:POKE 53277,3
420 POKE XD,PEEK(89):POKE OE,128:POKE 559,46:BF=1:SHOTS=0:HU=-1:POKE 756,UJ+4
430 ? #6;CHR$(125):FOR LOOP2=0 TO 3:POSITION 0,LOOP2*2:FOR LOOP=1 TO 6:? #6;CHR$(5+32*LOOP2+LOOP2
+64*(LOOP2>1));" ";:NEXT LOOP:NEXT LOOP2
431 RETURN
440 DATA 60,126,255,231,195,129,0,0,60,126,255,231,195,129,0,0,60,126,255,231,195,129,0,0
445 DATA 60,126,255,231,195,129,0,0,60,126,255,255,255,255,126,60,60,126,255,255,255,255,126,60
450 DATA 60,126,255,255,255,255,126,60,60,126,255,255,255,255,126,60
460 DATA 60,1,0,126,1,0,219,0,0,255,0,0,189,0,192,195,0,192,255,0,0,165,0,0
500 FOR LOOP=1 TO 7
501 POSITION 0,LOOP-1:? #6;"               "
510 POSITION 0,LOOP:? #6;"    &";:POSITION 13,LOOP:? #6;"&"
520 IF BHR=156 THEN BHR=158:GOTO 530
522 BHR=156
530 POKE 756,BHR
535 SOUND 0,255,8,10:FOR TFMB=1 TO 10:NEXT TFMB:SOUND 0,0,0,0
536 FOR TFMB=1 TO 35:NEXT TFMB
540 NEXT LOOP
550 FOR LOOP=1 TO 500:NEXT LOOP
560 RETURN
```

Variable checksum = 1435997

Line num range			Code	Length
1	-	80	DL	581
90	-	140	IU	616
150	-	180	QG	545
190	-	222	TG	531
225	-	290	YC	596
291	-	350	YB	544
360	-	400	BW	595
410	-	445	LW	557
450	-	550	BU	497
560	-	560	EQ	6

See page 62.

TYPO – TYPE YOUR PROGRAM ONCE

by William Wilkinson

"TYPO" is designed to help you find typing errors made when entering BASIC programs published in ANTIC. When used properly, TYPO will produce a table of values which can be used to pinpoint where an error was made. ANTIC will publish a table with every BASIC listing, and the user may compare the two tables to ensure they are identical. If they are not, then the user presumably made a "typo" which needs to be corrected.

How To Use TYPO

1. Enter program listing #1 EXACTLY as shown.
2. LIST this program to disk (LIST "D:TYPO.LIS") or cassette (via LIST "C:"). When using a cassette, use an entire blank cassette for just this program.
3. Type NEW to clear memory.
4. Type in a program from the magazine.
5. LIST this program to the disk (LIST "D:NAME") or cassette (LIST "C:"). Type NEW and reenter the program (ENTER "D:NAME" or ENTER "C:").
6. Append the TYPO program onto the end of the program from the disk (ENTER "D:TYPO.LIS") or cassette (ENTER "C:").
7. Type GOTO 32000 and a checksum table will be printed on your screen. Compare this table with the one published, if they agree you are finished and the program should run.
8. Note the value of the "Variable checksum" printed on the screen, and keep it handy.
9. If the table does not agree with the published table, examine the lines which have codes and/or lengths which disagree. Correct any errors.
10. IF AND ONLY IF the variable checksum you noted agrees with that printed in the magazine, goto step 7 above and try again.
11. If the variable checksums do NOT agree, you MUST goto step 5 above and perform the listing and reentering ritual! You may skip step 6, however, since presumably you have the combined programs now LISTed together.

Follow these instructions exactly!

What TYPO Is Telling You

THIS PROGRAM IS FUSSY! It cares about every little period, comma, and even spaces. It also cares about the order in which you typed in program lines! The order in which the variable names are stored depends upon the order the lines were typed. Should this order be altered the values of the tokens and the subsequent checksums will be altered.

The "Variable checksum" is used to correct for some of this by producing an (almost) unique checksum which depends on the order in which the variables are stored. If your checksum doesn't agree, you have either entered lines in the wrong order or misspelled a variable name. In either case, you MUST correct your error(s) and then go through the LIST / NEW / ENTER sequence to assure that the variables are put back in order.

The length shown is the number of bytes encountered by TYPO within the line number range shown. The two letter code is essentially a checksum of "length" bytes within that same range. If the length is correct and the checksum is off, you have made a spelling or punctuation error. Watch out: since all keywords and operators (including two character operators such as "< =") are tokenized as one byte, the length might stay the same even though you type SETCOLOR for CLR. Note!! You MAY use abbrevations for keywords as long as the LISTed result conforms to the magazine listing.

If the length bytes disagree you have added or deleted characters. If nothing obvious shows, pay special attention to characters in quoted strings and / or REMark statements. It is easy to omit a space or punctuation in a REMark, thinking that "REMarks don't matter"; but to TYPO they do.

Using TYPO With BASIC A+

Both versions produce identical checksum and length codes when used with any program. BUT entering a magazine program under BASIC A+ and then running TYPO on it will NOT produce the same checksum codes that will be given under Atari BASIC (this is because the internal token values are slightly different under BASIC A+).

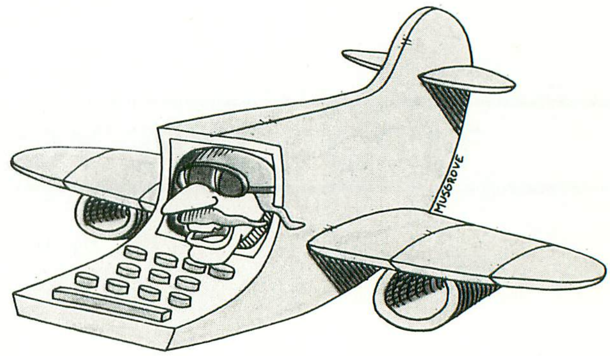
This is a small but sophisticated program, use it and typing errors will be reduced.

NOTE: *TYPO asks for output file. Respond with S for television or P for printer.*

continued on page 52

COLORS FOR YOUR PILOT

by Ken Harms



This month I will show you how to use all 128 colors of the ATARI and how you can rapidly change these colors in your displays.

To display data on the TV screen, PILOT first gets data (character or graphics information) from your program and then looks at special memory locations to determine the color to use. You can use a maximum of four colors at one time on your screen. Each color is selected by the PEN: (color) instruction. This instruction calls these locations by the names "Red", "Blue", "Yellow", and "Erase". Once PILOT knows what name (location) a line belongs to, it uses the color value found there for all lines drawn by that PEN:(color) instruction.

When PILOT looks at the "Blue" location it will find a color value there. This value will cause the ATARI to draw blue lines when you first turn it on. Fortunately, you can put any color value into these locations. So, even though PILOT calls these locations by color names (for convenience) any color may be found there. You can change these colors using a special form of the C:ompute command. Turn your machine on and type this in direct mode:

```
C:@B710 = 86
C:@B712 = 5*16 + 6
```

The first instruction might be spoken "Compute byte 710 equals 86". In this case, the 710 is the special address PILOT calls its "Blue" location. The 86 is a color value for a red color. In effect we put "red paint into a can labeled blue".

In the second instruction, the "712" is PILOT's "Erase" register. The "5" is a hue (color) number and the "6" is a luminance number (more on them later).

In the graphic mode, PILOT uses four locations or registers. Their names, addresses and uses are listed in Table 1.

TABLE 1

Name	Register	Value	Used for	Address
Red	0	70	Graphics	708
Yellow	1	26	Graphics	709
Blue	2	148	Text Window & Graphics	710
None	3	148	Not Used	711
Erase	4	0	Background & Border	712

You change the color of any register (paint can) by placing a different color value in any of the addresses. Color values are made up of two numbers, a "hue number" and a "luminence" or brightness number. Table 2 gives these values and what they usually look line on my TV.

TABLE 2

Hue	Luminance
0 = gray	0—lowest possible luminance (black)
1 = green brown	2—
2 = yellow/orange	4—
3 = orange	6—
4 = red/orange	8—
5 = pink	10—
6 = bluish purple	12—
7 = purple	14—maximum luminance (white)
8 = blue	
9 = bright blue	
10 = turquoise	
11 = greenish blue	
12 = green	
13 = yellowish green	
14 = orangish green	
15 = light orange	

The color value needed in each register is calculated as follows:

Hue number*16 + luminance number.

A color value for the red we used above is 86 or "165 + 6." Changing a register can be done at any time in your program.

The listing draws two horses in different color registers and then changes the colors rapidly to illustrate the power of this technique.

Let me leave you with an experiment: Use Mode 1 or Mode 2 letters (see last issue) and determine which color registers are used for uppercase and lowercase letters.

You may be interested in a new learning club for PILOT/LOGO users. It has a good newsletter, simple programs and an educational orientation. It is free to people under 18. Write to:

Young People's LOGO Association
1208 Hillsdale Drive
Richardson, Texas 75081

See page 38 for listing.

ATARI SAYS ITS FIRST WORD

WITH A VOICE BOX BY THE ALIEN GROUP!



THE ALIEN GROUP has emerged from the underground, daring to offer a full-featured speech synthesis system that is flexible, low in cost, and needs no accessory devices. No Interface, Cables, Speaker, Amp, or External Power Required! **VOICE BOX** has been designed and programmed by Atari users to become the integral voice of a *400* or *800* computer. Simply plugged into the serial port, **VOICE BOX** automatically routes all speech into the speaker of your television monitor. With the menu-driven operating system supplied, you'll be creating original, intelligible speech within moments after loading disk or cassette. No lengthy or obscure instructions to wade through.

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ALSO AVAILABLE AT LEADING COMPUTER STORES THROUGHOUT THE WORLD.

PILOT *listing*

```
10 R:HOUSES
20 R:------- Draws houses and shifts
30 R:------- all four color registers
40 R:------- ANTIC Issue 3
50 *COLOR
60 GR:CLEAR
70 GR:GOTO -20,10
80 U:*HOUSE
90 GR:GOTO 20,10
100 U:*HOUSE
110 U:*REGISTER0
120 PA:240
130 U:*REGISTER1
140 PA:240
150 U:*REGISTER2
160 PA:240
170 U:*REGISTER4
180 E:
190 *HOUSE
200 GR:PEN YELLOW
210 GR:TURNTO0
220 GR:TURN 135;DRAW 14
230 GR:TURN 45;PEN BLUE;DRAW 15 [REG 2
240 GR:TURN 90;DRAW 5
250 GR:TURN 90;FILL 8
260 GR:TURN -90;DRAW 10
270 GR:TURN -90;PEN RED;FILL 8 [REG 0
280 GR:TURN 90;PEN BLUE;DRAW 5
290 GR:TURN 90;FILL 14
300 GR:TURN 45;PEN YELLOW;FILL 14 [REG 1
310 E:
320 *REGISTER0
330 C:#A=192 [HUE 12 LUM 0
340 *INCREMENT0
350 C:@B708=#A
360 T:708 = #A
370 PA:30
380 C:#A=#A+2
390 J(#A<202):*INCREMENT0
400 E:
410 *REGISTER1
420 C:#A=224 [HUE 14 LUM 0
430 *INCREMENT1
440 C:@B709=#A
450 T:709 = #A
460 PA:30
470 C:#A=#A+2
480 J(#A<228):*INCREMENT1
490 E:
500 *REGISTER2
510 C:#A=80  [HUE 5 LUM 0
520 *INCREMENT2
530 C:@B710=#A
540 T:710 = #A
550 PA:30
560 C:#A=#A+2
570 J(#A<88):*INCREMENT2
580 E:
590 *REGISTER4
600 C:#A=144 [HUE 9 LUM 0
610 *INCREMENT4
620 C:@B712=#A
630 T:712 = #A
640 PA:30
650 C:#A=#A+2
660 J(#A<152):*INCREMENT4
670 E:
```

by James Capparell

MEMORY MAP

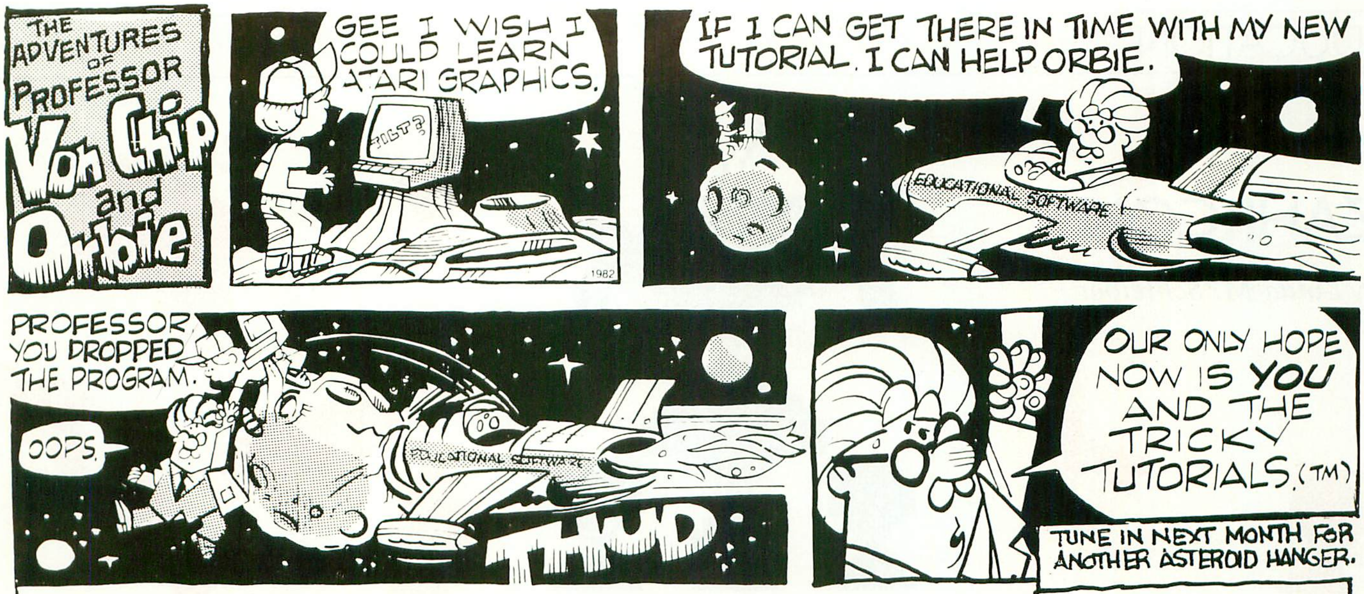
Page 2 continued

Memory Map is an on-going feature of ANTIC. We intend to publish the function of all the low memory RAM locations. The format for our description is:

12	$C	2	DOSINI	The Operating System variable called DOSINI uses 2 contiguous locations starting at address 12 (decimal) or C (hexidecimal).

566	$236	4	SPARE	No Operating System Function.
570	$23A	1	CDEVIC	???
571	$23B	1	CCOMND	???
572	$23C	1	CAUX1	???
573	$23D	1	CAUX2	Command auxiliary byte.
574	$23E	1	TEMP	Receives one-byte responses from serial bus controllers.
575	$23F	1	ERRFLG	Error flag any device error except timeout errors.
576	$240	1	DFLAGS	Disk flags from sector 1, contains value of first byte of boot file.
577	$241	1	DBSECT	Number of disk boot sectors.
578	$242	2	BOOTAD	Address where disk boot loader will be put.
580	$244	1	COLDST	Coldstart flag when = 1 then powerup in progress. When = 0 then S/RESET in progress. If set = 1 during norm program execution then S/RESET will act like powerup giving some protection.
581	$245	1	SPARE	No Operating System Function.
582	$246	1	DSKTIM	Disk timeout register.
583	$247	40	LINBUF	Character line buffer used to temporarily buffer one physical line of text when screen editor is moving screen data
626	$26F	1	GPRIOR	Global priority shadow for PRIOR [$D01B] controls priority of player/missile/playfield.
672	$270	8	PADDL0 - PADDL7	Potentiometer 0 - 7 storage.
635	$278	4	STICK0 - STICK3	Joystick 0 - 3 values.
636	$27C	8	PTRIG0 - PTRIG7	Paddle trigger 0-7.
644	$284	4	STRIG0	Joystick trigger 0 - 3.
648	$288	1	CSTAT	No Operating System Function.
649	$28	1	WMODE	Used by cassette handler as read/write mode flag. O = read; $80 = write.
650	$28A	1	BLIM	Cassette record data size Count of # of data bytes being read range 1-128 depends on record control byte.
651	$28B	4	SPARE	No Operating System Function.
656	$290	1	TXTROW	Text row cursor range 0-3.
657	$291	2	TXTCOL	Text column cursor range 0-39 used in split screen. These two variables give cursor position.
659	$293	1	TINDEX	Split screen text window index always = 0 when SWPFLG[78] = 0 equivalent of DINDEX.
660	$294	2	TXTMSC	Split screen text window version SAVMSC[58].
662	$296	6	TXTOLD	Oldrow and old column for text and then some split screen cursor data.
668	$29C	1	TMPX1	??
669	$29D	1	HOLD3	Used by the display handler to hold scroll loop counter.
670	$29E	1	SUBTMP	??
671	$29F	1	HOLD2	??
672	$2A0	1	DMASK	??

To be continued



TRICKY TUTORIALS (tm)

There are many things that the ATARI computers can do either better, or easier than other small computers. The following series of programs is designed for anyone who is at least familiar with BASIC programming. What each tutorial offers is similar to an extensive magazine article with all discussion in as simple language as possible, plus you get MANY examples already typed in and running. The instruction manuals range from 10 to 50 pages, and some tutorials fill up a complete tape or disk. There is little overlap in what is taught, so anyone wanting to know all they can should buy them all (my banker thanks you). ATARI buys these from us to use in training their own people! Rave reviews have been published in ANTIC, ANALOG, CREATIVE COMPUTING, and even INFOWORLD. You trust INFOWORLD, don't you?

TT #1: DISPLAY LISTS—This program teaches you how to alter the program in the ATARI that controls the format of the screen. Normally, when you say "Graphics 8", the machine responds with a large Graphics 8 area at the top of the screen and a small text area at the bottom. Now, you will be able to mix various Graphics modes on the screen at the same time. The program does all of the difficult things (like counting scan lines). You will quickly be able to use the subroutines included in your own programs.
16K Tape or 24K Disk. **$19.95**

TT #2: HORIZONTAL/VERTICAL SCROLLING—The information you put on the screen, either GRAPHICS or TEXT, can be moved up, down, sideways, or diagonally. We provide the basic methods and leave the rest up to your skill and imagination. Includes 18 examples to get you started, with several using a small machine language subroutine for smoothness.
16K Tape or 24K Disk. **$19.95**

TT #3: PAGE FLIPPING—Now you don't have to redraw the screen every time you change the picture or text. You will learn how to have the computer draw the next screen you want to see while you are still looking at the previous screen, then flip to it instantly. You won't see it being drawn, so a complicated picture can seem to just appear. Depending on your memory size and which graphics or text modes you are using, you can instantly look at up to 50 pages. The basic method takes only 9 lines and the usefulness is infinite.
16K Tape or 24K Disk. **$19.95**

TT #4: BASICS OF ANIMATION—This program shows you how to animate simple shapes (with some sound) using the PRINT and PLOT commands, and it also has a nice little PLAYER/MISSILE GRAPHICS game you can learn from. The P/M example is explained and will get you started on this complicated subject (more fully explained in TT #5). This would be an excellent way to start making your programs come alive on the screen with movement! Recommended for beginning users.
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TT #5: PLAYER/MISSILE GRAPHICS—Learn to write your own games and other animated applications! The tutorial begins with many small examples that compliment the 50 page manual, then gradually builds up to a complete game where everything you need to know is fully explained. Also included are two machine language utilities that you can use to animate Players with from BASIC. Next we include two of the best editors currently available; one for editing playfield shapes (backgrounds); and one to edit your players, and all in glorious Technicolor!! Everything except the two editors run in 16K Tape or 32K Disk. **$29.95**

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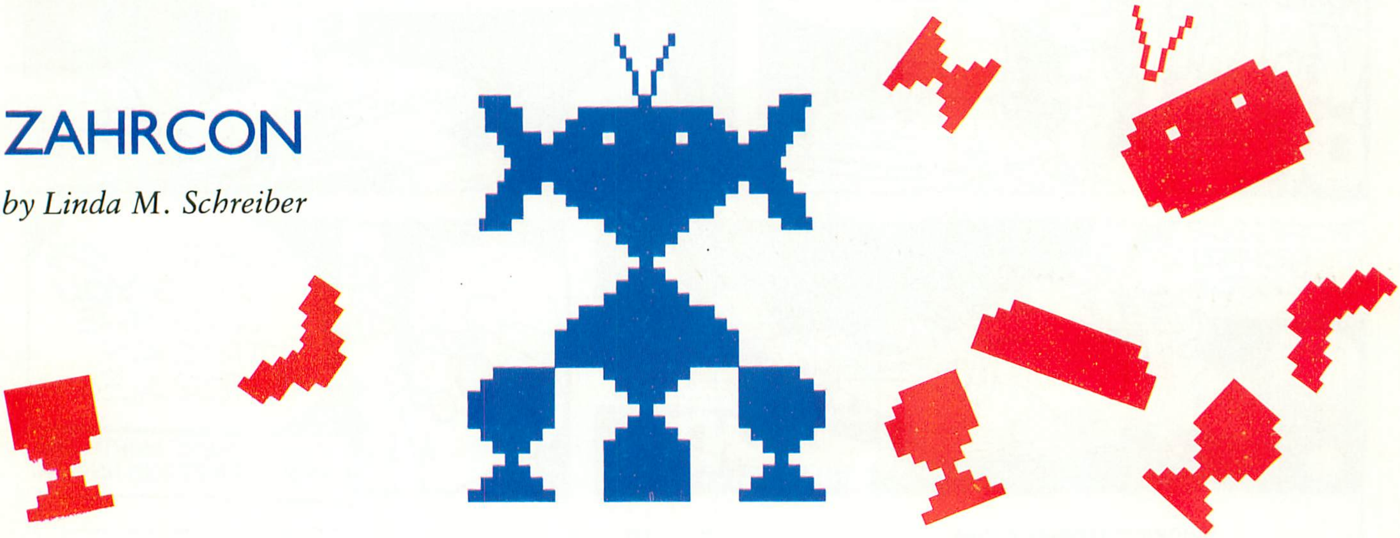
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ZAHRCON

by Linda M. Schreiber



ZAHRCON is a modification of the familiar game of HANG-MAN. This article shows you how to write it in BASIC with your ATARI computer.

The game of HANG-MAN has been written for every computer on the market today, but as an educational game it has a major flaw. It rewards the player (child) for failing to guess the word. The kids like to see the little "man" get "hung," especially when the computer enhances this outcome with a special graphics display and noises.

When developing educational games for children, we should save the positive reinforcement for correct behavior. There should not be a reward for wrong answers, especially when deliberate. ZAHRCON attempts to improve on HANG-MAN by rewarding the player for guessing correctly the letters comprising the secret word generated by the computer. Each proper letter helps build an animated "creature," accompanied by special graphics and sound.

Since ZAHRCON is designed for children, some as young as five or six, the letters displayed on the screen should be large and clear. Only one word needs to be displayed at any time, so Graphics Mode 2 is a good choice. Upper case letters with numbers and symbols will be better than lower case, and we will need to redefine some of the symbols into graphics characters that will build the creature.

To redefine a character set, we must decide which characters will not be needed in the program. We must also create our new characters to replace the old ones. Each letter, character, or symbol that is on the screen is made up of 8 bytes. Since each byte is 8 bits, a character occupies an 8 × 8 matrix. If a bit is "on" (set to "1"), the corresponding pixel will be lit on the screen. Next, we must calculate the place in the character set where we will be putting our new characters. Figure 1 illustrates how the character set is place in ROM.

To change the character set, we must first move the character set from ROM into RAM, then replace the old characters with the new ones. In this program, we will replace the character set from the quotation mark to the period. To calculate the RAM location of the first character that will be changed, we multiply its position in the character set by 8. The space, which occupies the first 8 bytes, is counted as the zeroeth position. The exclamation point is the first position, etc. The quotation marks begin with the sixteenth byte of the character set. This is where our new characters will begin. Figure 2 shows the old character set and the new character set that will replace it.

Once we have redefined our characters, we can begin our program. Our menu will offer two choices: to play the game or to end it. By moving the joystick forward and backward, we can move the arrow up or down on the screen. Press the red button on the joystick when the choice has been made.

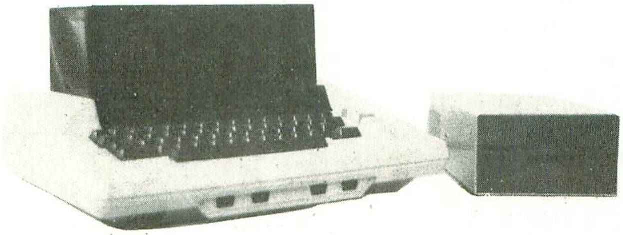
While the player is deciding whether or not to play, our creature displays some life. The winking and blinking is obtained by changing the character that is used for the creature's eyes. The character that replaces the apostrophe is used for both eyes, the quotation mark has been replaced with the left eye, the slash is now the right eye, and the asterisk is for no eyes. If the red button has not been pressed after a given amount of time, the program will choose one of the three options and PRINT it in the location of both eyes. After another set amount of time, both eyes will appear again on the screen. This same principle is used at the end of the game when the child wins. Even though it doesn't seem like much, this kind of enhancement can make the difference between a mediocre program and a good one.

The game essentially plays like HANG-MAN. The player is rewarded with another part of the creature whenever a letter is guessed that belongs in the secret word. If the child solves the word within a certain number of tries, the creature winks and blinks, and there is a graphics and sound reward.

continued on page 46

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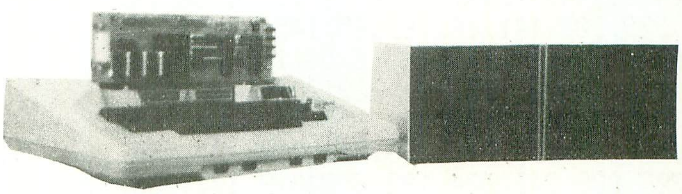
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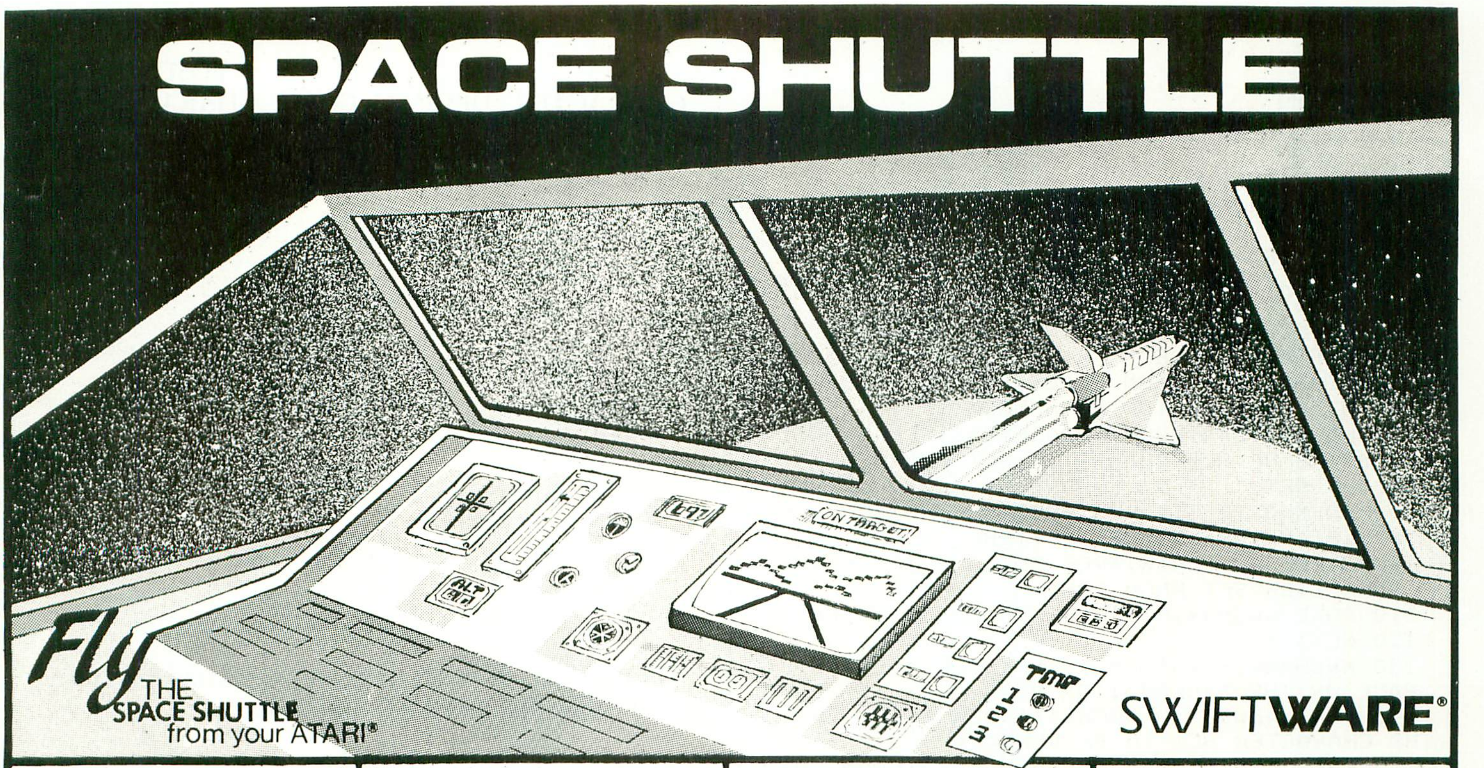
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```
0361 ;LENGTH TO MOVE =
0362 ;MEMTOP -
0363 ;ADDRESS OF LAST LINE
0364 ;
0365  SEC
0370  LDA MEMTOP
0375  SBC HIADR
0380  STA MOVLEN
0385  LDA MEMTOP+1
0390  SBC HIADR+1
0395  STA MOVLEN+1
0400 ;
0401 ;LENGTH OF POINTER
0402 ;ADJUSTMENT =
0403 ;HIADR - LOADR
0404 ;
0405  SEC
0410  LDA HIADR
0415  SBC LOADR
0420  STA MEMADJ
0425  LDA HIADR+1
0430  SBC LOADR+1
0435  STA MEMADJ+1
0445 ;
0446 ;REMOVE DELETED SPACE
0447 ;
0450  LDY #0
0452  LDX MOVLEN+1
0454  BEQ NOPG
0456 NXT256 LDA (HIADR),Y
0458  STA (LOADR),Y
0460  INY
0462  BNE NXT256
0464  INC HIADR+1
0466  INC LOADR+1
0468  DEX
0470  BNE NXT256
0472 NOPG CPY MOVLEN
0474  BEQ ADJPNT
0476  LDA (HIADR),Y
0478  STA (LOADR),Y
0480  INY
0482  BNE NOPG
0500 ;
0501 ;ADJUST BASIC POINTERS
0502 ;
0505 ADJPNT LDX #0
0510  LDY #4
0515 ADJLOP SEC
0520  LDA STMCUR,X
0525  SBC MEMADJ
0530  STA STMCUR,X
0535  LDA STMCUR+1,X
0540  SBC MEMADJ+1
0545  STA STMCUR+1,X
0550  INX
0555  INX
0560  DEY
0565  BNE ADJLOP
0566 ;
0567 ;RETURN TO USER
0568 ;
0570  RTS
0700 ;
0701 ;SEARCH BASIC'S
0702 ;STATEMENT TABLE FOR A
0703 ;LINE NUMBER => LINNBR
0704 ;
0705 SRCHLN LDY #2
0710  LDA (HIADR),Y
0715  STA LINLEN
0720  DEY
0725  LDA (HIADR),Y
0727  DEY
0730  CMP #128
0735  BEQ LINRET
0740  CMP LINNBR+1
0745  BEQ LOOKLO
0750  BCS LINRET
0755  BCC BMPLIN
0760 LOOKLO LDA (HIADR),Y
0765  CMP LINNBR
0770  BCS LINRET
0775 BMPLIN CLC
0785  LDA LINLEN
0790  ADC HIADR
0795  STA HIADR
0800  BCC SRCHLN
0805  INC HIADR+1
0810  BNE SRCHLN
0820 LINRET RTS
0959 ;
0960 MOVLEN .BYTE 0
0961  .BYTE 0
0965 LINNBR .BYTE 0
0966  .BYTE 0
0970 MEMADJ .BYTE 0
0971  .BYTE 0
0975 LINLEN .BYTE 0
0999  .END
```

Listing 1 — BASIC

```
10 DATA 216,104,104,141,185,6,104,141,18
4,6,165,136,133,203,165,137,133,204,32,1
36,6,165,203,133,205,165,204,133
11 DATA 206,104,141,185,6,104,24,105,1,1
41,184,6,144,3,238,185,6,32,136,6,56,165
,144,229,203,141,182,6,165,145
12 DATA 229,204,141,183,6,56,165,203,229
,205,141,186,6,165,204,229,206,141,187,6
,160,0,174,183,6,240,14,177,203
13 DATA 145,205,200,208,249,230,204,230,
206,202,208,242,204,182,6,240,7,177,203,
145,205,200,208,244,162,0,160,4
14 DATA 56,181,138,237,186,6,149,138,181
,139,237,187,6,149,139,232,232,136,208,2
36,96,160,2,177,203,141,188,6,136
15 DATA 177,203,136,201,128,240,30,205,1
85,6,240,4,176,23,144,7,177,203,205,184,
6,176,14,24,173,188,6,101,203
16 DATA 133,203,144,215,230,204,208,211,
96,0,0,0,0,0,0,0
17 RESTORE 10:FOR I=1536 TO 1724
18 READ A:POKE I,A:NEXT I
19 X=USR(1536,0,19)
```



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ZAHRCON *listing*

```
10 REM ZAHRCON
20 REM BY L.M. SCHREIBER FOR ANTIC
30 REM MAY 1982
40 DIM WORD$(10),YWORD$(10),A(26)
50 GRAPHICS 18:REM GRAPHICS 2 WITH NO TEX
T WINDOW
60 TOP=PEEK(106):REM FIND OUT HOW MUCH ME
MORY IS AVAILABLE
70 CHBASE=TOP-4:REM PLACE CHARACTER SET 1
024 BYTES BELOW TOP OF MEMORY
80 OLDCH=57344:NWCH=CHBASE*256:REM STARTI
NG BYTES OF OLD CHARACTER SET AND NEW CHA
RACTER SET
90 FOR X=0 TO 511:REM MOVE THE NUMBERS, S
YMBOLS AND UPPER CASE LETTERS
100 C=PEEK(OLDCH+X):REM GET A BYTE OF THE
 CHARACTER SET FROM ROM
110 POKE NWCH+X,C:REM RELOCATE IT IN RAM
120 NEXT X
130 NWCH=NWCH+16:REM DO NOT REPLACE THE S
PACE OR THE EXCLAMATION POINT
140 FOR X=NWCH TO NWCH+111:REM BYTES IN T
HE CHARACTER SET TO BE REPLCED
150 READ C:REM READ THE NEW BYTE FROM THE
 DATA BASE
160 POKE X,C:REM REPLACE THE OLD BYTE WIT
H THE NEW ONE
170 NEXT X
180 DATA 255,255,255,255,255,255,63,63
181 DATA 129,66,66,36,36,36,24,24
182 DATA 128,224,120,62,31,31,15,15
183 DATA 15,31,63,127,255,0,0,0
184 DATA 63,63,127,127,255,255,255,255
185 DATA 255,255,255,255,255,255,60,60
186 DATA 252,252,254,254,255,255,255,255
187 DATA 255,255,255,255,127,127,63,63
188 DATA 255,255,255,255,255,255,255,255
189 DATA 255,255,255,255,254,254,252,252
190 DATA 255,126,60,24,24,60,126,255
191 DATA 1,7,30,124,248,248,240,240
192 DATA 240,248,252,254,255,0,0,0
193 DATA 255,255,255,255,255,255,252,252
200 POKE 756,CHBASE:REM CHANGE TO THE NEW
 CHARACTER SET
210 POKE 77,0:? #6;"}":POSITION 4,3:? #6;
"#"
220 POSITION 2,4:? #6;"$&'(-      PLAY"
230 POSITION 2,5:? #6;"%)*+."
240 POSITION 4,6:? #6;","
250 POSITION 3,7:? #6;"&*("
260 POSITION 2,8:? #6;"& , (      end"
270 POSITION 2,9:? #6;", * ,"
280 POSITION 6,1:? #6;"ZAHRCON":P=4:P1=4:
C=0:GOSUB 990
290 POSITION 10,P:? #6;" ":POSITION 10,P1
:? #6;">":REM ERASE THE LAST ARROW AND PO
SITION THE NEW ONE
300 C=C+1:IF C<75 THEN S=39:GOTO 330
310 IF C=75 THEN S=42:X=INT(RND(0)*3):IF
X=1 THEN S=34
```

continued on next page

FIGURE 1

CHARACTER	DECIMAL CODE	POSITION IN CHARACTER SET
[SPACE]	20	0
!	21	1
"	22	2
#	23	3
$	24	4
%	25	5
.	.	.
[ctrl] A	1	64
[ctrl] B	2	65
[ctrl] C	3	66
.	.	.
.	.	.
.	.	.
a	97	97
b	98	98
c	99	99

The placement of the characters in the character set do not follow their decimal or ATASCII codes.

FIGURE 2

OLD CHARACTER	NEW CHARACTER
"	left eye
#	antennae
$	left top ear
%	left bottom ear
&	left top head
'	both eyes
(	right top head
)	left bottom head
*	no eyes
+	right bottom head
,	neck also part of leg
-	right top ear
.	right bottom ear
/	right eye

The character set on the left will be replaced with the character on the right.

Variable checksum = 438736

Line num range			Code	Length
10	-	110	RO	524
120	-	185	JB	435
186	-	230	ZQ	486
240	-	320	SQ	510
330	-	400	UF	561
410	-	490	UQ	556
500	-	560	ZF	508
570	-	660	XL	527
670	-	740	FD	506
750	-	820	GM	572
830	-	910	MJ	571
920	-	1003	BU	306
1004	-	1014	DM	150

```
320 IF X=2 THEN S=47
330 POSITION 4,4:? #6;CHR$(S):IF C>100 TH
EN C=0
340 IF STRIG(0)=0 THEN 390:REM CHOICE HAS
 BEEN MADE
350 IF STICK(0)=15 THEN 300:REM CHECK FOR
 MOVEMENT ON JOYSTICK
360 POKE 77,0:IF STICK(0)=14 THEN P=P1:P1
=P1-4:IF P1<4 THEN P1=4:REM CHECK FOR TOP
 OF MENU
370 IF STICK(0)=13 THEN P=P1:P1=P1+4:IF P
1>8 THEN P1=8:REM CHECK FOR BOTTOM OF MEN
U
380 GOSUB 990:GOTO 290
390 POKE 77,0:IF P1=8 THEN FE=FRE(S):END

400 ? #6;"}":FOR X=2 TO 10:POSITION 1,X:?
 #6;CHR$(63+X):NEXT X:REM PRINT LETTERS O
N THE RIGHT
410 FOR X=2 TO 10:POSITION 2,X:? #6;CHR$(
72+X):NEXT X
420 FOR X=2 TO 9:POSITION 3,X:? #6;CHR$(8
1+X):NEXT X
430 X=INT(RND(0)*15):RESTORE 1000+X
440 READ WORD$
450 L=LEN(WORD$):P=10-L/2:REM POSITION TO
 CENTER THE QUESTION MARKS
460 FOR X=P TO P+L-1:POSITION X,11:? #6;"
?":NEXT X:REM QUESTION MARKS FOR THE LETT
ERS
470 FOR X=1 TO 26:A(X)=0:NEXT X:YWORD$(1)
=" ":YWORD$(10)=" ":YWORD$(2)=YWORD$:X=1:
P1=2:LT1=0:LT2=0
480 LT=0
490 S=(X-1)*9+95+P1:POSITION X,P1:? #6;CH
R$(S):GOSUB 990
500 IF STICK(0)=14 THEN POSITION X,P1:? #
6;CHR$(S-32+A(S-96)):P1=P1-1:IF P1=1 THEN
 P1=10:X=X-1
510 IF X=0 THEN X=3:P1=9
520 IF STICK(0)=13 THEN POSITION X,P1:? #
6;CHR$(S-32+A(S-96)):P1=P1+1:IF P1=11 THE
N P1=2:X=X+1:IF X=4 THEN X=1
530 IF P1=10 AND X=3 THEN P1=2:X=1
535 IF STICK(0)=13 OR STICK(0)=14 THEN PO
KE 77,0
540 IF STRIG(0)=0 THEN 560
550 GOTO 490
560 POKE 77,0:IF A(S-96)=128 THEN 480
570 A(S-96)=128:REM KEEP LETTER BLUE  ON
SCREEN
580 S=S-32:REM GET TRUE CHARACTER VALUE
590 FOR C=1 TO LEN(WORD$):IF ASC(WORD$(C,
C))=S THEN POSITION P+C-1,11:? #6;CHR$(S)
:YWORD$(C,C)=CHR$(S):LT=1
600 NEXT C
610 IF LT=1 THEN 630
620 GOTO 740
630 SN=50:LT1=LT1+1:GOTO 630+LT1*10
640 POSITION 5,7:? #6;"&":POSITION 5,8:?
#6;",":GOTO 880
650 POSITION 7,7:? #6;",":POSITION 7,8:?
#6;"*":GOTO 880
660 POSITION 9,7:? #6;"(":POSITION 9,8:?
#6;",":GOTO 880
670 POSITION 6,6:? #6;"&*(":GOTO 880
```

continued on next page

BUFFER/EPSON PRINTERS

Reviewed by Ken Harms

Practical Peripherals, Inc.
31245 La Baya Drive
Westlake Village, CA 91362
$159

As you have probably noticed the ATARI can put letters on the screen faster than any printer can print them. To compensate for this speed discrepancy most printers have a small amount of "on-board" memory which acts to buffer the incoming data. The buffer fills when the ATARI issues a print command. The fill occurs at relatively high speed. The ATARI then must wait while the printer empties the buffer as it prints at a relative snails pace. This fast fill, long wait cycle repeats until the current print job is completed. It is very wasteful of your time.

If the buffer were larger the print/wait cycle would be much shorter. Practical Peripherals now sells a buffer for all Epsons which holds over 16,000 characters. This board, the MBP-16K, fits inside the Epson and connects to the ATARI 850 Interface, if you own an Epson, you can add this powerful accessory for $159.000.

I called the Practical Peripherals folks and ordered one. Good service; it arrived in a few days — always a good sign. Even I had no trouble following the simple instructions: open the Epson, remove taped-in plastic door, plug in board (needed a number 0 Phillips screwdriver), close Epson, plug in printer cable. In less than five minutes, I was buffering!

What productivity! My Visicalc sheet with 50 rows of 17 columns each 12 spaces wide is in the printer in less than 10 seconds!. Of course, the printer churns away for another three minutes but I've gone on to save that sheet, call in another and start modifying it. I don't feel bad running a draft of this article in Letter Perfect — it takes only 8 seconds.

After connecting the Macrotronics graphics interface, I dump a full graphic screen to the buffer in 31 seconds. By my calculations, the ATARI drives the buffered Epson at a rate of 750 to 800 characters per second, about 10 times as fast as the printer without a buffer.

The buffer holds about four pages at a time. The Practical Peripheral buffer handles larger jobs by accepting the first 16,000 characters in one stream and a new line every time a line is printed. While this is happening, of course, the ATARI slows down to printer speed.

I also installed the board in an MX-100 with the new Graftrax Plus; it worked perfectly.

After extensive testing (the publisher owes me a new ribbon!), I found that the Practical Peripherals MBP-16K operated perfectly, with no hassle, on all tested software. After many contacts to verify the results of my testing, I found the staff to be knowledgeable and helpful. If you have an Epson, I recommend the MBP-16K. When you order, be sure to tell them it's for an ATARI and that you want "Revision 2.11" or later.

```
680 POSITION 7,5:? #6;",":GOTO 880
690 POSITION 6,4:? #6;")*+":POSITION 6,3:
? #6;"&*(":GOTO 880
700 POSITION 5,3:? #6;"$":POSITION 5,4:?
#6;"%":GOTO 880
710 POSITION 9,3:? #6;"-":POSITION 9,4:?
#6;".":GOTO 880
720 POSITION 7,3:? #6;"'":GOTO 880
730 POSITION 7,2:? #6;"#":POSITION X,P1:?
 #6;CHR$(S+128):GOTO 880
740 SN=90:LT2=LT2+1:GOTO 740+LT2*10
750 POSITION 14,7:? #6;"&":POSITION 14,8:
? #6;",":GOTO 880
760 POSITION 16,7:? #6;",":POSITION 16,8:
? #6;"*":GOTO 880
770 POSITION 18,7:? #6;"(":POSITION 18,8:
? #6;",":GOTO 880
780 POSITION 15,6:? #6;"&*(":GOTO 880
790 POSITION 16,5:? #6;",":GOTO 880
800 POSITION 15,4:? #6;")*+":POSITION 15,
3:? #6;"&*(":GOTO 880
810 POSITION 14,3:? #6;"$":POSITION 14,4:
? #6;"%":GOTO 880
820 POSITION 18,3:? #6;"-":POSITION 18,4:
? #6;".":GOTO 880
830 POSITION 16,3:? #6;"'":GOTO 880
840 POSITION 16,2:? #6;"#":POSITION X,P1:
? #6;CHR$(S+128)
850 POSITION P,11:? #6;WORD$:SOUND 0,200,
10,10:GOSUB 990:SOUND 0,0,0,0
860 IF STRIG(0)=0 THEN GOSUB 990:POSITION
 0,0:GOTO 210
870 GOTO 860
880 FOR SS=16 TO 0 STEP -2:SOUND 0,SN,10,
SS:NEXT SS
890 IF YWORD$(1,L)<>WORD$ THEN 480
900 IF LT1<10 THEN 630:REM FINISH BODY
910 POSITION 6,1:? #6;"          ":GOSUB 99
0:POSITION 6,1:? #6;"HURRAY!!":X=INT(RND(
1)*3)+1:ON X GOTO 920,930,940
920 S=42:GOTO 950
930 S=47:GOTO 950
940 S=34
950 IF STRIG(0)=0 THEN GOSUB 990:GOTO 210

960 POSITION 7,3:? #6;CHR$(S):REM PRINT A
N EYE
970 GOSUB 990
980 POSITION 7,3:? #6;"'":GOSUB 990:GOTO
910
990 FOR TIME=1 TO 50:NEXT TIME:RETURN
1000 DATA COULD
1001 DATA COUPLE
1002 DATA KENNEL
1003 DATA KINDS
1004 DATA CROCODILE
1005 DATA FRECKLES
1006 DATA BACKWARDS
1007 DATA PACKAGE
1008 DATA NICKEL
1009 DATA MECHANIC
1010 DATA LEPRECHAUN
1011 DATA ORCHESTRA
1012 DATA SKUNK
1013 DATA TRAGIC
1014 DATA ANTIQUE
```

```
640 REM READ JOYSTICK AND SET PLAYER
650 REM PARAMETERS APPROPRIATELY.
660 ST=STICK(0)
670 IF ST=15 THEN 590
680 IF ST=6 OR ST=10 OR ST=14 THEN YSPIDER=YSPIDER-1:YLINE=YLINE-2
690 IF ST>4 AND ST<8 THEN XSPIDER=XSPIDER+2:XLINE=XLINE+1
700 IF ST=5 OR ST=13 OR ST=9 THEN YSPIDER=YSPIDER+1:YLINE=YLINE+2
710 IF ST>8 AND ST<12 THEN XSPIDER=XSPIDER-2:XLINE=XLINE-1
720 REM VERTICAL MOTION OF PLAYER
730 SPIDER$(YSPIDER,YSPIDER+7)=SSPIDER$
740 SPIDER$(YSPIDER-8,YSPIDER-1)=ERASE$
750 SPIDER$(YSPIDER+8,YSPIDER+15)=ERASE$
760 REM CHECK FOR CURSOR OUT OF RANGE
770 IF XSPIDER<41 THEN XSPIDER=41:XLINE=XLINE+1
780 IF XSPIDER>199 THEN XSPIDER=199:XLINE=XLINE-1
790 IF YSPIDER<14 THEN YSPIDER=14:YLINE=YLINE+2
800 IF YSPIDER>109 THEN YSPIDER=109:YLINE=YLINE-2
810 REM HORIZONTAL MOTION OF PLAYER
820 POKE 53248,XSPIDER
830 REM DRAW SPIDER TRAIL
840 DRAWTO XLINE,YLINE
850 GOTO 590
860 REM ROUTINE TO DRAW FRAME. THIS
870 REM SHOWS LIMITS OF SCREEN.
880 COLOR 1
890 PLOT 0,0:DRAWTO 79,0:DRAWTO 79,191:DRAWTO 0,191:DRAWTO 0,0:RETURN
```

If you don't have a GTIA chip, you can still play. Just make the following changes to the listing.

```
130 GRAPHICS 7+16
530 C=0:XLINE=79:YLINE=35
540 SETCOLOR 4,0,0:POKE 704,8
542 SETCOLOR 0,3,8:SETCOLOR 1,6,8
544 SETCOLOR 2,9,8
610 IF C>3 THEN C=0
620 COLOR C:POKE 704,C*48+8
680 IF ST=6 OR ST=10 OR ST=14 THEN YSPIDER=YSPIDER-1:
    YLINE=YLINE-1
690 IF ST>4 AND ST<8 THEN XSPIDER=XSPIDER+1:XLINE=
    XLINE+1
700 IF ST=5 OR ST=13 OR ST=9 THEN YSPIDER=YSPIDER+1:
    YLINE=YLINE+1
710 IF ST>8 AND ST<12 THEN XSPIDER=XSPIDER-1:XLINE=
    XLINE-1
790 IF YSPIDER<14 THEN YSPIDER=14:YLINE=YLINE+1
800 IF YSPIDER>108 THEN YSPIDER=108:YLINE=YLINE-1
890 PLOT 0,0:DRAWTO 0,95:DRAWTO 159,95:DRAWTO 159,0:
    DRAWTO 0,0:RETURN
```


CROSSFIRE
C.DELLORCO '81

THRESHOLD

On-Line Systems
36575 Mudge Ranch Road
Coarsegold, CA 93614
40K disk (no cassette); ?

Reviewed by Beth Kaplan

If you're looking for a challenging "shoot-'em-up" space game, try Threshold. The excellent graphics and animation combine for an exciting, yet frustrating time.

Your ship, the Threshold, has the job of defending the trade routes from wave and after of enemy ships. The action is smooth and fast, and the shapes and colors are imaginative and very well executed.

There are 24 different types of enemy spacecraft to be eliminated, each with a unique attack pattern. Some are "kamikazie" pilots that dive down suddenly and destroy your gun! Other ships will disappear off the play field only to reappear someplace else, sometimes right on top of the Threshold. The enemy has six groups of four different ships. So far, I've only been able to reach the fourth group.

If you survived four waves of assailants, a reward of fuel is offered. Fighting stops, the Threshold is automatically moved to the center of the screen, and a mother ship docks. Lasers are cooled and fuel is refilled.

Your mission is completed with the destruction of the last group of aliens. The last group has special characteristics, which the authors refuse to reveal. Their only comment is that when players get there, they'll know!

Four levels of play are available; fast or slow speed, with or without a star background. The stars make the game more difficult because some stars are the same color as the alien bombs. The player gets five ships per game. A bonus ship is awarded at 50,000 points, and another for every 100,000 points after that.

The screen display is relatively simple. On the left is the play field. On the right side are two columns. One column measures fuel consumption. If you run out of fuel, the game is over. The other column indicates the temperature of the laser weapon. When it overheats, the player cannot shoot until it cools sufficiently.

Threshold features two types of defense, lasers and the hyper-warp drive. By pulling back on the joystick, enemy movement and firing rate is slowed, while the Threshold retains its normal powers.

Threshold is one of the better arcade games available for the ATARI. Care has been taken to provide an entertaining and well-developed program. Threshold is the type of game about which you say, "Just one more game and then I'll shut it off", but never do. It's that addicting!

WORDRACE

Don't Ask Computer Software
2265 Westwood Blvd. B-150
Los Angeles, CA 90064
$00.00 from dealer or
direct from publisher

Reviewed by Ron Mitchel

The wordsmiths at Don't Ask have divided a dictionary of 2000 words into a word game of three levels. The Beginner's level contains words that should be moderately difficult for grade school age. The Regular level has words that are seldom used and should be known by high school students. The Challenge level would be difficult for even the most devoted crossword puzzle fan.

As many as four players can compete in each game. Each player has a menu of six definitions of a given word. A "clock" starts counting backwards from 600 points as soon as the word appears on the television screen. If the word is defined correctly, the number of points on the "clock" is added to the player's score. If the word is incorrectly defined, then the points are subtracted from the score and the player continues until the word is defined or the clock runs out.

WORDRACE, according to Don't Ask, will increase the players' vocabulary skills. I must agree. Without WORDRACE I never would have learned the meaning of rimrose or pottle. I also found myself checking the dictionary quite often to see if their definition was correct. Except for one word, my dictionary always agreed with theirs.

Don't Ask Software are the folks that created Abuse, the tricky little program that allows you and your ATARI Home Computer to trade insults. WORDRACE is up to the standards that Don't Ask set with Abuse. The graphics could have been better done perhaps, but then this *is* a word game.

When my daughters, ages 11 and 12, tried WORDRACE they were frustrated searching for the correct keyboard keys to press to define each word. Perhaps a choice of six definitions is too many for younger players.

Don't Ask plans a series of diskettes, including an additional dictionary of words and a "Famous Names". All will use WORDRACE as the "boot up" program.

Listing 1 — TYPO for Atari BASIC

Variable checksum = 50796

Line num range	Code	Length
32000 - 32200	QD	518
32220 - 32290	WQ	310

Result of using TYPO to check itself
(MUST have changed 32000 to 32500 in lines 32180 and 32200 first!)

```
32ØØØ REM Type Your Program Once -- "TYPO"
321ØØ CLR :DIM Q$(2Ø):QF=7:CLOSE #QF:? "File for output ";
3211Ø INPUT Q$:OPEN #QF,12,Ø,Q$:QREM=Ø
3213Ø QCNT=1:FOR QADDR=PEEK(13Ø)+256*PEEK(131) TO PEEK(132)+256*PEEK(133)-1
3214Ø QSUM=QSUM+PEEK(QADDR)*QCNT:QCNT=QCNT+1:NEXT QADDR
3215Ø ? #QF;"Variable checksum = ";QSUM:? #QF
3216Ø QADDR=PEEK(136)+256*PEEK(137):? #QF;"   Line num range    Code  Length"
3217Ø QLINE=PEEK(QADDR)+256*PEEK(QADDR+1)
3218Ø IF QLINE>=32ØØØ THEN END
3219Ø QLEN=Ø:QSUM=QLEN:QCNT=QLEN:? #QF;"    ";QLINE,"- ";
322ØØ IF  NOT (QCNT<12 AND QLEN<5ØØ AND QLINE<32ØØØ) THEN 3227Ø
3222Ø QLEN=QLEN+PEEK(QADDR+2):QCNT=QCNT+1
3223Ø IF PEEK(QADDR+4)=Ø AND QREM THEN QADDR=QADDR+PEEK(QADDR+2):GOTO 3226Ø
3224Ø FOR QADDR=QADDR TO QADDR+PEEK(QADDR+2)-1
3225Ø QSUM=QSUM+PEEK(QADDR):NEXT QADDR
3226Ø Q$=STR$(QLINE):QLINE=PEEK(QADDR)+256*PEEK(QADDR+1):GOTO 322ØØ
3227Ø QSUM=QSUM-676*INT(QSUM/676):QCNT=INT(QSUM/26)
3228Ø ? #QF;Q$,CHR$(65+QCNT);CHR$(65+QSUM-26*QCNT);"     ";QLEN
3229Ø GOTO 3218Ø
```

Listing 2 — TYPO+ for BASIC A+

Variable checksum = 50796

Line num range	Code	Length
32000 - 32220	PH	478
32230 - 32300	JG	243

Result of using TYPO+ to check itself
(MUST have changed 32000 to 32500 in lines 32180 and 32200 first!)

```
32ØØØ REM TYPE YOUR PROGRAM ONCE FOR BASIC A+ -- "TYPO+"
321ØØ CLR :DIM Q$(2Ø):QF=7:CLOSE #QF
3211Ø INPUT "File for output ? ",Q$:OPEN #QF,12,Ø,Q$:QREM=Ø
3213Ø QCNT=1:FOR QADDR=DPEEK(13Ø) TO DPEEK(132)-1:QSUM=QSUM+PEEK(QADDR)*QCNT
3214Ø   QCNT=QCNT+1:NEXT QADDR
3215Ø ? #QF;" Variable checksum = ";QSUM:? #QF
3216Ø QADDR=DPEEK(136):? #QF;" Line num range    Code  Length"
3217Ø QLINE=DPEEK(QADDR)
3218Ø WHILE QLINE<32ØØØ
3219Ø   QLEN=Ø:QSUM=QLEN:QCNT=QLEN:? #QF; USING "#####  /-  ",QLINE;
322ØØ   WHILE QCNT<12 AND QLEN<5ØØ AND QLINE<32ØØØ
3222Ø     QLEN=QLEN+PEEK(QADDR+2):QCNT=QCNT+1
3223Ø     IF QREM AND  NOT PEEK(QADDR+4):QADDR=QADDR+PEEK(QADDR+2)
32235       ELSE
3224Ø       FOR QADDR=QADDR TO QADDR+PEEK(QADDR+2)-1
3225Ø         QSUM=QSUM+PEEK(QADDR):NEXT QADDR
32255       ENDIF
3226Ø     Q$=STR$(QLINE):QLINE=DPEEK(QADDR)
32265     ENDWHILE
3227Ø   QSUM=QSUM-676*INT(QSUM/676):QCNT=INT(QSUM/26)
3228Ø   ? #QF;Q$,CHR$(65+QCNT);CHR$(65+QSUM-26*QCNT);"     ";QLEN
3229Ø   ENDWHILE
323ØØ END
```


SPACE
ACE
R Nelson

ATMASD (macro-assembler)
Manufactured by:
ELCOMP, Inc.
53 Redrock Lane
Pomona, CA 91766
(714) 632-8314
Price: $89.00
Diskette

ATMASD means ATARI Macro-Assembler, Disk version. This is a software tool from ELCOMP that combines the abilities of several of its products into a masterful whole. The product is meant for use in Assembly Language programming, and essentially provides a way to move about in the program, see what has been done, examine registers and memory locations, make specific changes, and when ready, compile the completed program.

Some tool of this kind is necessary for machine language programming. ATMASD includes a machine language monitor (available separately as ATMONA-1 for $19.95), and an assembly language editor (available separately as ATAS for $49.95).

DATA PERFECT ATARI
(program)
Manufactured by:
LJK Enterprises
P.O. Box 10827
St. Louis, MO 63129
(314) 846-6124
Price: $99.95
Diskette

This data base program for the ATARI 400 or 800 requires 32K RAM. It is compatible with LJK's "Letter Perfect" word processor program and drives any parallel printer.

DATA PERFECT ATARI is written in machine language, so is very compact, and eliminates disk-swapping. It is menu-driven, but allows the user to design his own screen mask. Multiple searches and sorts are possible. Output includes reports (lists) and labels. Mathematical operations, including formulas, can be performed on or between fields. A complete disk utility section is included, and the program will support one or two disk drives.

CHEM LAB SIMULATIONS
(education)
Manufactured by:
High Technology Software, Inc.
2201 N.E. 63rd
P.O. Box 14665
Oklahoma City, OK 73113
(405) 478-2105
Price: $100 (each)
Diskette only

These programs simulate chemistry experiments that can be used with a group, or individually. They are designed by a chemistry professor, and are interactive with the student(s).

Chem Lab 1 simulates acid-base titration and the determination of Avogadro's Number. Chem Lab 3 demonstrates calorimetry, including Hess's law, and realistically animates calorimetric experiments. Chem Lab 4 covers thermodynamics, and illustrates heat changes in vaporization and the thermodynamics of an equilibrium reaction. Chem Lab 2 (gas law) is not currently available for the ATARI.

These programs require 40K RAM.

LEADING EDGE DISK SYSTEM
Manufactured by:
The Leading Edge
8642A Spicewood Springs Rd., No. 532
P.O. Box 10998
Austin, TX 78766
(512) 258-3828
Price: $1,150.00

This system expands the ATARI 800 into a professional software development tool with much faster data-to-disk transfer time than the standard 810 drive procedures.

The minimum system includes a boxy expansion unit that replaces the 800's lid, a single/double density diskette drive, and connectors. The expansion unit adds six slots to the 800. It comes with a "motherboard," disk drive controller, and operating system T-Card.

Data transfer time is increased up to seven times normal, significantly reducing "waiting-time" for busy programmers. It can also be used for fast duplication of diskettes by driving a chain of up to eight drives ($375 each); or serve as a word processing disk conversion system.

It is fully compatible with existing ATARI software, and no modifications of ATARI DOS are required. Expansion boards for the new slots include EPROM burners (2716 or 2732), RS-232 Serial Interface, and a Centronics Interface ($99 each). The burners can be used with any 800 without the system.

ATTACK AT EP-CYG-4 (game)
Manufactured by:
BRAM Inc.
18779 Kenlake Pl. NE.
Seattle, WA 98155
(206) 644-3425

You have just been revived from four years of stasis. The brutal machine race called Tartillians have already destroyed their humanoid creators and have sworn the destruction of all humanoid forms. As you board your gravitron drive attack ship, you cling to the hope that it is not too late to save Earth. The Tartillians await below . . . on EP-CYG-4.

This unique new game from BRAM requires 24K disk version, 16K cassette version. There are 3 different missions to choose from on the disk, and 2 on the cassette.

CROSSWORD MAGIC
Manufactured by:
L&S Computerware
1589 Fraser Drive
Sunnyvale, CA 94087
(408) 738-3416
Price: $49.95

This program generates crossword puzzles. You provide the words and definitions, it connects them and designs the format. Somewhere between a game and a tool, Crossword Magic should be educational as well as fun. Puzzles can be generated around any theme (eg. ATARI) in any matrix from 3X3 to 20X20.

It requires the ATARI 800 with 40K and a disk drive, and will print out on most graphics-capable printers. A version for the ATARI 400 is in the works.

NEW PRODUCTS

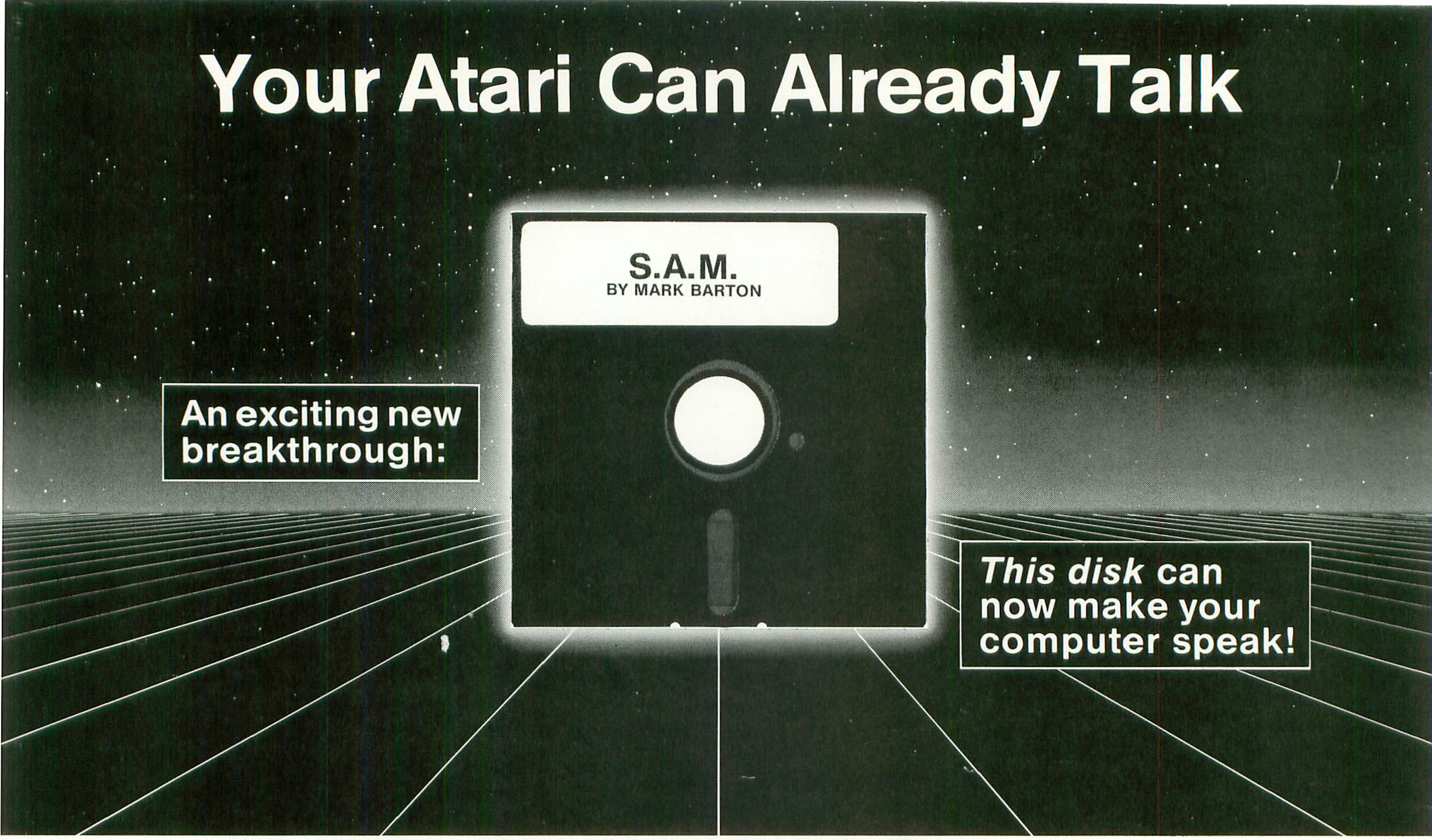
VERVAN UTILITIES
Manufactured by:
VERVAN Software
10072 Balsa Street
Cucamonga, CA 91730
Price: varies, see below
Media: varies, see below

Six utilities for the ATARI 400 and 800 include: CASDUP (copies any ATARI cassette), cassette only, $20.00; CASDIS (converts cassette to diskette), diskette only, $25.00; DISDUP (duplicates "difficult" disks), diskette only, $25.00; VARMAP (lists BASIC variables with line numbers), cassette or disk, $25.00; LINMAP (lists BASIC line numbers with all referenced lines), cassette or disk, $25.00; FULMAP (VARMAP + LINMAP + indirect addressing list), cassette or disk, $40.00.

MICROPERS
(payroll/personnel program)
Manufactured by:
Compumax Associates, Inc.
P.O. Box 7239
Menlo Park, CA 94025
Price: $200
Diskette (two drives required)

MICROPERS is a business program that keeps complete personnel files, calculates pay, prints checks, fills out W-2 forms, and produces useful reports. Two drives and an ATARI 800 with 48K RAM are required. A printer is needed for hard-copy products.

MICROPERS is designed for use under California law, but can be adapted to other states (or foreign countries) by a competent BASIC programmer. It keeps records for each employee, including employment history, salary or wage, and accumulated deductions. It calculates the payroll, figures Federal and state tax withholdings, social security deductions, disability insurance, miscellaneous deductions, and gross/net pay. Reports generated include the quarterly "941" report, labor costs by job, and an overall labor recap report. It is menu-driven and provides security levels to safeguard information.



It's the **Software Automatic Mouth — S.A.M.**
The brand new, all-software, high quality speech synthesizer
from **DON'T ASK.**

S.A.M. gives you:
Unlimited vocabulary
Full inflection at your control
Effortless access from BASIC
Separate pitch and speed control
Thorough, instructive owner's manual
Easy-to-learn phoneme spelling system
And automatic English-to-speech conversion
Elaborate internal pronunciation rules for natural-sounding speech

S.A.M for the ATARI 400/800 includes:
- **S.A.M.** on disk
- Complete documentation
- English-phoneme dictionary

Only $59.95

Note: On the ATARI, screen blanks during vocal output.

ATARI is a trademark of ATARI INC.

Hear S.A.M. at your favorite computer store today.
For more information, contact:

DON'T ASK
Computer Software
2265 Westwood Blvd., Ste. B-150
Los Angeles, California 90064
(213) 397-8811

- For a copy of the owner's manual, specify computer and send $2.00 to **DON'T ASK.**
- You can order **S.A.M.** directly from **DON'T ASK.** Add $2.00 for shipping and handling to your check or money order (or order C.O.D.).

Dealer inquiries welcome

Talk is cheap

TURTLE GRAPHICS

Part I

by Gordon Smith



This is the first of two articles on implementing a Turtle Graphics system in FORTH.

Let me make two quick points about FORTH:

- Doing this project in any other computer language would have been so involved that I would never have done it, and so lengthy that this magazine would never have published it.
- Doing it in FORTH was so easy it took me considerably longer to write the English for this article than the FORTH!

Those of you who have Pink Noise Studios' pns-FORTH (I use version 1.4) can edit the screens accompanying these articles "as is" and start turtle-ing. If you have another implementation of FORTH for the ATARI, some revisions are inevitable. I have used words like PLOT and DRAWTO, that pns-FORTH provides for making graphics calls to the ATARI's operating system. Your system may already have similar words. In Part 2 (next issue), I'll discuss the functions of any non-fig-FORTH words that I've used.

Turtle Graphics Versus Coordinate Graphics

"Turtle Graphics" is a simple but powerful approach to creating graphic designs with a computer. It was originally developed in the 1960's at MIT — primarily by computer scientist, child psychologist, and educator Seymour Papert — as part of the LOGO system.

Let me give you a very simple example of how it works. Suppose we want to draw a square on the screen, 10 units on a side. The sequence of commands

```
10 DRAW
90 TURN
10 DRAW
90 TURN
10 DRAW
90 TURN
10 DRAW
90 TURN
```

or, in a shorter form,

```
4 ( 10 DRAW 90 TURN )
```

requests an imaginary turtle on the screen to crawl 10 units forward, draw a line as it goes, turn 90 degrees clockwise, repeat four times. The turtle will leave behind a square.

By typing

```
DEFINE SQUARE AS 4 ( 10 MOVE 90 TURN ) END
```

we can add the new command SQUARE to our turtle's graphics repertoire. Then typing the single command

```
SQUARE
```

will have the same effect as our previous sequence of commands. For example, to draw a square tilted by thirty degrees, we need only to type

```
30 TURN
SQUARE
```

The conventional approach to graphics, in which one must specify fixed screen coordinates and the endpoints of each line is much more complicated.

The principle advantage of Turtle Graphics is that it describes shapes in an intrinsic way, without referring to where they are or how they're oriented. The numbers used in Turtle Graphics represent easily visualizable things, like lengths of lines, or angles.

A further important aspect of a Turtle Graphics system is the nature of the programming it encourages: structured, modular, and hierarchichal. The DEFINE . . . AS . . . END construct shown above is the key to this. Basic subdesigns can be made into new turtle commands which are then as much a part of the turtle's language as the predefined system commands. These higher-level commands can then be used to define still higher ones, and so on.

For example, a simple picture of a house like that in Figure 1 could be drawn with a long sequence of DRAWs and TURNs (along with another command for the turtle to move without drawing). But the structure of the design cries out for the programmer to instead first enrich the turtle's vocabulary by defining commands such as, perhaps, RECTANGLE, WINDOW, DOOR, FRONT, AND ROOF, before using these higher-level command to define on called HOUSE.

The FORTH Advantage

FORTH is so ideally suited to Turtle Graphics that, in a sense, implementing it is a trivial exercise.

The most complicated aspect of Turtle Graphics is the problem of providing a programming environment in which

turtle commands can be executed. Such a capability is already intrinsic to FORTH, while it is quite foreign to conventional languages like BASIC.

The point here is that the turtle's language can be just an extension of the FORTH language — turtle commands are simply FORTH words. There is no need to write an extensible command language processor. That's what a FORTH system already is!

What the Screens Contain

The ten screens of FORTH listed in this article lay the necessary foundations for us to build a Turtle Graphics system in Part 2 (next issue). The words here are not specifically turtle-oriented. Rather, they extend FORTH's capabilities in directions particularly useful to the application.

Screens 1, 2, and 3 add some trigonometric capability to FORTH. If the turtle is to move 10 units forward at 30 degrees from the vertical, we need to compute how far up and how far over she goes. For this we use a lookup-table approach. Scaling the values by 10000 enables us to store them as single-precision integers. The words SIN* and COS* are the result of this. For example,

```
10 30 SIN*
```

leaves 5, or 10 times the sine of 30 degrees, on the stack; and this is how far over the turtle would move.

Screen 4a makes available a defining word, VALUE, for a new data type. An alternative to CONSTANT and VARIABLE, VALUE words tend to make FORTH code more readable. They are best explained by the following example:

```
VALUE A  VALUE B  VALUE C
ok
2 TO A  3 TO B
ok
A . B .
2 3 ok
A B + TO C C .
5 ok
```

VALUE words return their value when executed, except when they are preceded by TO; in which case they store the top of the stack into themselves. (This idea has been discussed in the FORTH DIMENSIONS newsletter of the Forth Interest Group.)

In screen 4a the words TO and VALUE are defined in assembly language, rather than FORTH, so that they will execute as fast as CONSTANTs and VARIABLEs. If you don't have an assembler, use the alternate FORTH code on screen 4b.

Screens 5 through 8, culminating in the word CLIP, implement a line-clipping algorithm. We want the turtle to be able to cross the edge of the screen, so that if we execute SQUARE when she is near the top we'll get a clipped box. But the opearing system will refuse to draw a line whose endpoints aren't both within the screen boundaries. Therefore, we must be able to calculate the endpoints of the portion of the line which lies on the screen. If we give CLIP the coordinates of two points, it first determines whether any part of the line between them lies within a "clipping rectangle" whose extent we can specify by setting the values of LEFT, RIGHT, TOP, and BOTTOM. (Note that these words are in the vocabulary CLIPPING). If so, it returns the coordinates of the endpoints of the portion within the clipping rectangle, and a true flag. If not, it returns only a false flag.

For example, suppose we set the clipping rectangle to be the size of the mode-7 graphics screen with

```
CLIPPING
0 TO LEFT
159 TO RIGHT
0 TO TOP
79 TO BOTTOM
```

Then

```
30 30  50 50  CLIP
```

leaves 30 30 50 50 1 on the stack because the line between (30,30) and (50,50) is completely within the clipping rectangle. But

```
80 100  200 40  CLIP
```

leaves 122 79 159 61 1 because only the portion between (122,79) and (159,61) of the specified line lies inside the clipping rectangle. And

```
200 200  300 300  CLIP
```

leaves 0 because no part of the line lies inside. The Cohen-Sutherland algorithm that CLIP uses is described in detail in Chapter 5, "Clipping and Windowing", of Newman and Sproull's *Principles of Interactive Computer Graphics*.

The last screen, number 9, defines the word GRAPHICS for opening the screen in the graphics mode specified by the top the stack, and LINE, which takes the coordinates of two endpoints and draws the clipped part of it on the screen.

If you want to see the clipping in action, before the rest of the code is given in Part 2, try the following: Define the words BORDER, RANDOM_LINE, and RANDOM_LINES as

```
: BORDER
                    CLIPPING
                     1 COLOR
            LEFT BOTTOM PLOT
              LEFT TOP DRAWTO
             RIGHT TOP DRAWTO
          RIGHT BOTTOM DRAWTO
           LEFT BOTTOM DRAWTO   ;

: RANDOM_LINE
  4 0 DO CRANDOM LOOP LINE   ;

: RANDOM_LINES
  0 DO RANDOM_LINE LOOP   ;
```

and then type

```
CLIPPING
20 TO LEFT
140 TO RIGHT
20 TO TOP
60 TO BOTTOM
7 GRAPHICS
BORDER
100 RANDOM_LINES
```

See you next issue!

```
(     Turtle Graphics I, screen 1          )

DECIMAL

TABLE SINES
0000 , 0175 , 0349 , 0523 , 0698 ,
0872 , 1045 , 1219 , 1392 , 1564 ,
1736 , 1908 , 2079 , 2250 , 2419 ,
2588 , 2756 , 2924 , 3090 , 3256 ,
3420 , 3584 , 3746 , 3907 , 4067 ,
4226 , 4384 , 4540 , 4695 , 4848 ,
5000 , 5150 , 5299 , 5446 , 5592 ,
5736 , 5878 , 6018 , 6157 , 6293 ,
6428 , 6561 , 6691 , 6820 , 6947 ,
7071 , 7193 , 7314 , 7431 , 7547 ,
7660 , 7771 , 7880 , 7986 , 8090 ,
8192 , 8290 , 8387 , 8480 , 8572 ,
8660 , 8746 , 8829 , 8910 , 8988 ,
9063 , 9135 , 9205 , 9272 , 9336 ,
9397 , 9455 , 9511 , 9563 , 9613 ,
9659 , 9703 , 9744 , 9781 , 9816 ,
9848 , 9877 , 9903 , 9925 , 9945 ,
9962 , 9976 , 9986 , 9994 , 9998 ,
10000 , -->


(     Turtle Graphics I, screen 2          )

: (SIN)   ( n1 --- n2 )
      DUP 90 > IF
  180 SWAP - THEN
           SINES ;

: SIN   ( n1 --- n2 )
  ( Returns 10000 times the sine )
  ( of n1 degrees. )
                 360 MOD
               DUP 0< IF
              360 + THEN
             DUP 180 > IF
  180 - (SIN) MINUS ELSE
            (SIN) THEN ;

: COS   ( n1 --- n2 )
  ( Returns 10000 times the cosine )
  ( of n1 degrees. )
  360 MOD   90 + SIN ;

-->
```

```
( 32 Turtle Graphics I, screen 3          )

: SIN*   ( n1 n2 --- n3 )
  ( Returns n1 times the sine of )
  ( n2 degrees. )
  SIN 10000 */ ;

: COS*   ( n1 n2 --- n3 )
  ( Returns n1 times the cosine of )
  ( n2 degrees. )
  COS 10000 */ ;

-->


( 33 Turtle Graphics I, screen 4a         )

0 VARIABLE TO-FLAG

CODE TO    ( --- )
  1 # LDA, TO-FLAG STA,
     NEXT JMP, END-CODE

: VALUE
                      0 CONSTANT
                           ;CODE
            TO-FLAG LDA, 0= IF,
       2 # LDY, W )Y LDA, PHA,
  INY, W )Y LDA, PUSH JMP, ELSE,
          0 # LDA, TO-FLAG STA,
    BOT LDA, 2 # LDY, W )Y STA,
     BOT 1+ LDA, INY, W )Y STA,
                 POP JMP, THEN,
                       END-CODE

-->


( 34 Turtle Graphics I, screen 4b         )

0 VARIABLE TO-FLAG

: TO
  1 TO-FLAG ! ;

: VALUE
         <BUILDS 0 ,
  DOES> TO-FLAG @ IF
        0 TO-FLAG !
            !  ELSE
            @  THEN ;

-->
```

continued on next page

```
(     Turtle Graphics I, screen 5          )

VOCABULARY CLIPPING  IMMEDIATE

CLIPPING DEFINITIONS

VALUE LEFT            VALUE TOP
VALUE RIGHT           VALUE BOTTOM

2 BASE !

: CODE    ( p --- n )
                                 0
                 OVER TOP < IF
     1000 + SWAP DROP ELSE
          SWAP BOTTOM > IF
                0100 + THEN
                         THEN
                OVER LEFT < IF
     0001 + SWAP DROP ELSE
           SWAP RIGHT > IF
                0010 + THEN
                         THEN ;
-->

(     Turtle Graphics I, screen 6          )

VALUE X1
VALUE Y1
VALUE C1
VALUE X2
VALUE Y2
VALUE C2
VALUE C

: CLIP_X    ( n1 --- n2 )
      Y1 -
   X2 X1 -
   Y2 Y1 -
  */  X1 + ;

: CLIP_Y    ( n1 --- n2 )
      X1 -
   Y2 Y1 -
   X2 X1 -
  */  Y1 + ;

-->

( 37 Turtle Graphics I, screen 7           )

2 BASE !

: WHERE?    ( --- p )
                         C 0001 AND IF
            LEFT  LEFT CLIP_Y  ELSE
                        C 0010 AND IF
            RIGHT  RIGHT CLIP_Y  ELSE
                         C 0100 AND IF
         BOTTOM CLIP_X  BOTTOM  ELSE
                        C 1000 AND IF
              TOP CLIP_X  TOP  THEN
                                THEN
                                 THEN
                                  THEN ;
DECIMAL

: HERE!    ( p --- )
                                C C1 = IF
  TO Y1   TO X1   X1 Y1 CODE TO C1  ELSE
  TO Y2   TO X2   X2 Y2 CODE TO C2  THEN ;

-->

( 38 Turtle Graphics I, screen 8           )

FORTH DEFINITIONS

: CLIP   ( p1 p2 --- p1' p2' t )
         (         or          )
         ( p1 p2 --- f         )
                           CLIPPING
   TO Y2    TO X2    X2 Y2 CODE TO C2
   TO Y1    TO X1    X1 Y1 CODE TO C1
                              BEGIN
                      C1 C2 OR WHILE
                       C1 C2 AND IF
                          0 ;S THEN
                               C1 IF
                       C1 TO C ELSE
                       C2 TO C THEN
                WHERE? HERE! REPEAT
                      X1 Y1 X2 Y2 1 ;

-->

( 39 Turtle Graphics I, screen 9           )

: GRAPHICS    ( n --- )
   ( Clears the screen and sets it up )
   ( for graphics mode n with a text )
   ( window. )
   >R   SETUP S   CLOSE S
    SPLIT-SCREEN   R> GR. ;

: LINE    ( p1 p2 --- )
   ( Displays whatever piece of the )
   ( line from p1 to p2 is within )
   ( the clipping window. )
        CL# @ COLOR
            CLIP IF
    PLOT DRAWTO THEN ;

;S
```

Reviewed by Cassie Stahl

ATARI LEARNING BY USING

by Thomas E. Rowley
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53 Redrock Lane
Ponoma, CA 91766

If you've finished your ATARI BASIC book by Albrecht and do not understand the Hardware/Software Manual yet, then this book may be for you. Thomas Rowleys' "ATARI BASIC—Learning by Using," will teach you some valuable techniques that will add a lot of diversity to your programs! This book is so thin you'd be apt to pass it up. Please don't. You'll be pleasantly surprised at the amount of information packed into these 73 pages.

The book gives you some simple sample programs. Type them into your ATARI and watch the action. These are deceptive programs to look at. They are so short that you won't be expecting the complex results.

One program illustrates how you can squeeze more colors out of Graphics 8 mode.

You'll also learn how to draw a circle and a star in graphics 7 & 8. Would a cover page add some extra pizazz to your program?

Would you like to try putting the console switches to use? It's easy with this book!!

Learn how to mix the graphic modes and use your Player/Missle graphics. Add a joystick or paddle controller to your games. Ask for input from the keyboard without interrupting the flow of the game. This technique can be used to do just about anything that you can think of.

There are several games in this book, yours free for the typing. Try them out and with a little study you'll learn even more.

Every page is packed full of information. You'll learn how to make the cursor disappear (POKE 752,1) and make it reappear (POKE 725,0). Flipping the text upside down and backwards is a snap (POKE 755,4) bringing it back is just as easy (POKE 755,0)! Are you lost on the screen? Try asking the computer for help. PRINT PEEK (84)) tells you which row you are on, (PRINT PEEK (85)) will tell you what column you are on. Would you like to put your cassette recorder to more use? POKE 54018,52 and stick in a music tape, when you are done POKE 54018,60 to turn the cassette motor off.

Well, I don't want to tell you everything. You will have to get a copy of the book for yourself. Sit down in front of your computer with this book and start hackin'! Good luck!!

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